ON-SITE REVIEW OF ELECTRIC UTILITY YEAR 2000 READINESS PROGRAMS

Prepared for
The United States Department of Energy

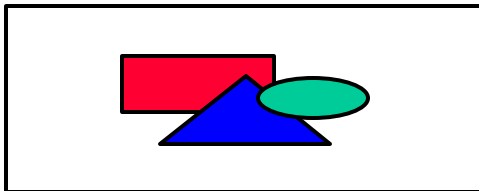### September 7, 1999

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Executive Summary

Background

In May 1998, the United States Department of Energy (DOE) asked the North American Electric Reliability Council (NERC) to assume a leadership role in facilitating preparations of the electric power production and delivery systems of the United States for transition into the Year 2000. In response, NERC defined a program for coordinating the Y2k preparedness efforts of the organizations that operate interconnected electric power systems in North America (including the U.S., Canada, and the Northern Baja area of Mexico). The goal of the NERC Y2k program is to facilitate processes that, when implemented, allow these electric power production and delivery systems to operate reliably into the Year 2000.

As part of the Y2k readiness reporting process, NERC has provided four quarterly reports to DOE on the status of Y2k efforts in the electric power industry. The most recent report was delivered to DOE on August 3, 1999. A copy of that report may be found at the NERC web site at http://www.nerc.com/y2k/. This latest NERC report provides these findings and others:

- NERC believes the electric systems of North America will operate reliably into the Year 2000 with the facilities that are Y2k Ready today.

    - 99% of bulk electric facilities are Y2k Ready.

    - 96.3% of distribution facilities are Y2k Ready.

    - 251 bulk electric systems were disclosed by name as Y2k Ready or Y2k Ready with Limited Exceptions

    - Y2k testing appears to indicate minimal impacts on the ability to produce and deliver electricity

- 17 entities reporting to NERC are not fully Y2k Ready; 10.5% of public power utilities were not fully Y2k Ready or did not report in the most recent quarter; and 14% of rural cooperatives were not fully Y2k Ready or did not report in the most recent quarter.

One basis for the NERC Y2k status assessments is the receipt of monthly reports from over 250 of the largest organizations operating bulk electric facilities. This self-reported data addresses the Y2k readiness status in the areas of generation (non-nuclear), transmission, distribution, telecommunications, and business systems.

The Y2k readiness status of commercial nuclear power facilities is reported separately to the Nuclear Energy Commission. The Nuclear Energy Institute provides information to NERC and DOE on nuclear facilities to coordinate those results with the rest of the industry.

In support of this industry reporting effort, the American Public Power Association (APPA) and the National Rural Electric Cooperative Association (NRECA) surveyed their respective sectors (public power and rural cooperatives) on a quarterly basis. These results have been incorporated into the quarterly NERC reports to DOE.

Purpose of this Report

While the industry-reported results are reassuring, DOE, as the responsible federal agency for commercial electric power, desires to further validate these

results. The enclosed study was commissioned by DOE to answer these two fundamental questions:

1. Is the industry's self-reported Y2k readiness status accurate and reliable?

2. Are smaller, local distribution systems more at risk?

On-site Review Process

DOE contracted a team of independent consultants to perform on-site audits at a randomly selected sample of electric power organizations. The 36 entities selected represent slightly more than 1% of the 3089 organizations in North America. The on-site review teams conducted their audits during June and July 1999 and prepared this report based on their findings. The audits included interviews with Y2k program personnel, review of Y2k program documentation, and rerunning of selected Y2k tests in the presence of the on-site review team.

The results presented in this report are intended to be representative of the industry and are not intended to disclose the status of an individual organization. The results are presented in detail for each site visit. However, the identity of each organization participating in the on-site reviews is masked.

The audits were conducted in the following groups. The number of audited entities in each segment roughly corresponds to 1% of each segment, except for the bulk entities and independent producers, which correspond to about 2%:

- 10 smallest public power (municipal) entities with less than 5,000 customers

- 10 mid-sized public power (municipal) entities with 5,000 to 40,000 customers

- 10 rural cooperatives

- 5 small to mid-sized investor owned bulk electric entities

- 1 independent power producer

Results

All 36 entities that were randomly selected for review agreed to allow an on-site audit of their Y2k program. There were no refusals to participate.

Based on the results of the on-site reviews, is the industry's self-reported Y2k readiness status accurate and reliable?

For 32 of the audited entities, the independent review team was able to compare the results of the on-site review with the information voluntarily reported to NERC or one of the trade associations (self-reported surveys were not available from the other four). Of the 32 entities compared, 27 provided self-reports that agreed with the on-site assessments. Of these 27, 23 were Y2k Ready by June 30, 1999, according to both the self-reported data and the on-site reviews. The remaining four were rated Y2k Ready after June 30, 1999 but expected to be completed in the third quarter of 1999.

There were differences between the self-reported data and the on-site reviews for the remaining five organizations, two over-stating their readiness and three understating their readiness. Two municipalities were determined by the on-site review team to be expected to achieve Y2k readiness after June 30, 1999, but had reported themselves as Y2k Ready by June 30, 1999. In the first case there was a disagreement regarding interpretation of Y2k readiness criteria – the

organization felt that a SCADA system that had not completed remediation and testing was Y2k Ready by virtue of a contingency plan. The on-site review team did not agree. In the second case, the on-site review team noted a critical test that had been missed by the organization.

Three audited utilities (1 municipal and 2 cooperatives) were rated Y2k Ready by June 30, 1999, but self-reported that they would not be ready until after June 30. The reason for the differences was the inclusion of non-mission critical systems in the self-reported readiness assessment.

In summary, the comparisons showed consistency for 27 entities, 2 entities overstated their readiness, three understated their readiness, and comparison information was not available for four of the entities. A general conclusion from this limited set of comparisons is that, viewed from the aggregate, the industry's self-reported data appears reasonably accurate and balanced. Viewed on an individual organization level, there are subjective judgments regarding Y2k readiness – some judgments have been made over-conservatively and some under-conservatively. On a whole the judgments appear to balance.

Are smaller, local distribution systems more at risk?

Based on the results of the on-site visits, smaller, local distribution systems do not appear to be at any greater risk for Y2k than larger systems. This conclusion is based on the following findings:

- Most of the smallest distribution entities do not have digital devices or computer systems used in the delivery of electricity and do not own generation.

- Small, local distribution systems are aware of the Y2k issue and are doing a good job in executing their Y2k remediation and testing.

- Although small distribution systems may have started their Y2k efforts later than larger systems, the limited number of digital items in their inventories has allowed them to complete the efforts in a shorter amount of time.

Other Key Findings

In the process of the audits, the on-site review team observed the following additional findings:

- The entities that were delayed beyond the June 30, 1999 industry target had completed their programs with the exception of a SCADA system or customer information system that was pending an upgrade, testing, or certification by an external vendor.
- There is a great amount of diversity and local judgment applied in developing Y2k testing methods and criteria. Most of the testing concerns identified during the on-site visits were related to SCADA systems.
- There were no apparent geographic differences related to Y2k readiness.

Recommendation

The on-site review team recommends further audits be conducted to address the concern noted in this initial review for dependency on vendors to complete upgrades, testing, and certification of SCADA systems, energy management systems, customer information systems, and other computer systems. These additional audits will also increase the sample size of the review. These audits should focus on systems that are likely to have such computer systems, principally the larger and mid-sized organizations.

I.   Introduction

I a.   Electric Industry Self-Assessment Process

Electricity is the lifeblood of modern society. In North America, nearly all aspects of social and economic well being depend on electricity and the public has come to expect electric service reliability that meets the highest standards in the world. The electric industry in North America depends on computers, communications, and electronics, and therefore faces a significant challenge in continuing reliable electric service into the Year 2000 (Y2k). Without a reliable supply of electricity as a foundation, potential Y2k transition challenges in other industries would become secondary.

In May 1998, the United States Department of Energy (DOE) asked the North American Electric Reliability Council (NERC) to assume a leadership role in facilitating preparations of the electric power production and delivery systems of the United States for transition into the Year 2000. In response, NERC defined a program for coordinating the Y2k preparedness efforts of the organizations that operate interconnected electric power systems in North America (including the U.S., Canada, and the Northern Baja area of Mexico). The ultimate goal of the NERC Y2k program is to facilitate processes that, when implemented, allow these electric power production and delivery systems to operate reliably into the Year 2000.

The NERC Y2k program focuses on facilitation in the following Y2k-related areas:

- Information sharing;

- Readiness progress reports;

- Operating risk evaluation and contingency plans;

- System studies;

- Drills;

- Operational security planning and preparations; and

- Coordination with telecommunications, fuel, and other industries with inter-dependencies.

As part of the Y2k readiness reporting process, NERC has provided four quarterly reports to DOE on the status of Y2k efforts in the electric power industry. The most recent report, covering the second quarter of 1999, was delivered to DOE on August 3, 1999 in a public press conference in Washington DC. A copy of that report may be found at the NERC web site at http://www.nerc.com/y2k/.

One basis for the NERC Y2k status assessment is the receipt of monthly reports from over 250 of the largest organizations operating bulk electric facilities. This self-reported data addresses the Y2k readiness status in the areas of generation (non-nuclear), transmission, distribution, telecommunications, and business systems. The Y2k readiness status of commercial nuclear power facilities is reported separately to the Nuclear Energy Commission. The Nuclear Energy Institute provides information to NERC and DOE on nuclear facilities to coordinate those results with the rest of the industry. The August 3, 1999 NERC report identified 251 organizations that NERC believed to be Y2k Ready or Y2k Ready with Limited Exceptions.

In support of this industry effort, the American Public Power Association (APPA) and the National Rural Electric Cooperative Association (NRECA) surveyed their

respective sectors (public power and rural cooperatives) on a quarterly basis. These results have been incorporated into the quarterly NERC reports to DOE.

I b.   Motivation for Independent Reviews of Y2k Readiness Reviews

This independent review effort was designed to address two main issues: the validity of self-reported data in the industry survey process and the Y2k readiness situation of smaller utilities.

Because the surveys by NERC, APPA, and NRECA all rely heavily on self-reported information, questions naturally arise regarding the accuracy of that information. Certainly, available evidence suggests that information is often subject to various internal or external audits at the utility level[1], and by state-level authorities in many states. Furthermore, there appears to be disincentives for a utility to misrepresent its Y2k readiness, given the risk of legal action by customers in the event Y2k-related service disruptions occur. Nonetheless, independent reviews of Y2k preparations can help to provide further validation and insight into the actual state of Y2k readiness.

Some Y2k observers have also expressed the concern that smaller electric utilities are less likely to be Y2 Ready than larger ones[2]. In the early stages of the self-reporting process, as summarized in the January 1999 and April 1999 NERC reports, municipal utilities and electric cooperatives, which on average are much smaller than most investor-owned utilities, generally reported lower average completion percentages for each of the Y2k milestones tracked. The following questions characterize some of the concerns related to smaller utilities:

- Did the smaller electric organizations (municipal power and distribution cooperatives) lack sufficient resources (staff, money, project management expertise) for Y2k inventory, assessment, remediation and testing efforts?

- Had they started later than the larger organizations?

- Were they encountering Y2k problems that the larger organizations were not encountering?

- Had they put the same effort into their Y2k projects that larger organizations had?

- Were there geographic differences that affected the Y2k projects?

- And were there reasons beyond their control that would keep them from meeting the most important of all Y2k readiness dates, December 31, 1999?

DOE determined that the best way to answer these questions was to conduct on-site Y2k readiness reviews of a sample group of municipal power and distribution cooperatives. To address the overall concern of validity of self-reported data, DOE decided to also include some of the larger organizations reporting Y2k readiness status monthly to NERC.

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[1] See "Preparing the Electric Power Systems of North America for the Transition to the Year 2000: A Status Report and Work Plan, Second Quarter 1999." Prepared for the U.S. Department of Energy by the North American Electric Reliability Council. August 3, 1999.
[2] Report by Senate Special Committee on the Year 2000 Technology Problem. Co-Authored by Senator Dodd. June 29, 1999.
See also "Year 2000 Computing Crisis: Readiness of the Electric Power Industry." U.S. General Accounting Office. April 6, 1999.

I c.   Project Methodology

Due to the immovable December 31, 1999 deadline, it was important to complete the project quickly, in order to have time to act if significant problems were found. Therefore, the project was organized to conduct Y2k on-site reviews in parallel using multiple project teams. As the sample size was relatively small, approximately 1%, and the time to complete the project short, it was imperative to develop a standard on-site review process with appropriate reporting documentation that could easily be replicated by multiple project teams.

The following documents were developed to support the project teams conducting the on-site reviews and are provided in Exhibit I to this report:

- On-Site Review Process

- On-Site Review Confirmation Letter

- Y2k Readiness On-site Check List

- Meeting Agenda

- Y2k On-site Interview Form

- Y2k Electric System Readiness Assessment

- Y2k Readiness Evaluation Form

- Telephone Call Form to Make Appointment for On-Site Visit

- A Checklist for Utility Program Review (Y2k Readiness Strategies)

- Profile of Organization Visited

The review teams were comprised of eight engineers with considerable professional experience in all aspects of the electric power industry. The team represented over 120 years of electric utility experience working with systems very similar to those deployed by the sample utilities. The reviewers were immediately familiar with the operations of the utilities and their potential vulnerability to Y2k issues.

The first two on-site assessments included all of the reviewers. This served as a pilot session for the reviewers and to fine-tune the project process and documentation. The first visits also provided an opportunity to quantify how long it would take to complete each on-site review. The review team knew going into the reviews that larger organizations would require more time and larger review teams, and the converse was true for smaller organizations. The insights from the early reviews were important in setting up reasonable schedules for the reviews.

The first two on-site assessments looked at the Y2k programs at a small municipal power organization (less than 5,000 customers) and a mid-sized Investor Owned Utility (IOU). The review team concluded from these two visits that smaller organizations would require one to two days on-site with a two person project team, and the larger organizations would require two days on-site with at least a three person project team.

The remaining organizations were divided among the reviewers to facilitate completion of the project as rapidly as possible.

I d.   Organization of This Report

This report documents the on-site review process and explains the findings on the readiness status of electric utilities. The chapter or section headings define the structure of the report:

Executive Summary:	Overview description of the project and summary of findings.
I. Introduction:	Background, objectives and methods for the on-site reviews.
II. Selection of Y2k On-Site Review Organizations:	Sampling, statistical analysis and confidentiality/anonymity.
III. Overview of On-Site Review Process	Review procedure, evaluation, criteria and results presentation.
IV. Y2k Strategies:	Overall approaches deployed by the sample utilities.
V. Procedures and Practices for Y2k Project Steps:	Analysis and remediation steps following in Y2k projects.
VI. Project Results:	Findings – overall and by industry segment.
VII. Y2k Concerns of Project Participants:	Special issues outside the project scope of concern to the sample utilities.
VIII. Comparison of On-Site Reviews and Self-Reports to NERC, APPA, and NRECA	One-to-one comparison of on-site assessment results with self-reported data.
IX. Conclusions and Recommendations	Overall observations and next steps.

II.   Selection of Y2k On-Site Review Organizations

II a.   Sampling Procedure

There are approximately 3,089 electric utility organizations in North America. 1,978 municipal power organizations reported their Y2k status through the American Public Power Association. 843 distribution cooperatives reported their Y2k status through the National Rural Electric Cooperative Association. 268 bulk entities reported through NERC.

A 1% sample size was determined to be appropriate, considering the project objectives and schedule. A 1% sample equates to approximately twenty municipal power organizations, ten distribution cooperatives and three bulk entities reporting to NERC. The number of NERC reporting organizations to be assessed was increased to six to include two more IOUs and an Independent Power Producer (IPP). IPPs are becoming an increasingly important source of power in the deregulated electric industry.

Municipal power organizations serve 40 million people in the United States (about 14% of customers). The distribution cooperatives serve 32 million people, or about 11% of customers. Together, public power and electric cooperative entities serve about 25% of the nation's electric load. The remaining 75% of electrical loads are served by investor-owned utilities.

In order to make the most efficient use of resources in assessing the Y2k readiness of the smallest electric organizations, the project team decided to divide the 20 municipal power organizations into two groups; 10 with less than 5,000 customers and 10 with 5,000 to 40,000 customers. Of the 1,978 municipal power organizations, 1,234 (62%) have less than 5,000 customers. In other words, the largest group of utilities consists of the very smallest organizations. The project team decided the most effective use of resources would be to allocate ten visits to these smallest entities.

The project team focused on rural electric cooperatives that were distribution-only entities without significant generation facilities. Their generation is often supplied by their affiliated generation and transmission cooperative (G&T), of which they are a member. The G&Ts report monthly to NERC.

Using a random number generator, 100 municipal power organizations were selected from the 1,978 on the APPA list. The selected entities were sorted into two groups: under 5,000 customers (74) and 5,000 to 40,000 customers (26). A second random selection process was then used to rank both lists of candidate entities. The first ten organizations in each list were determined to be the primary candidates from public power sector. The remaining organizations on the candidate list served as alternates in the randomly selected order. The review team anticipated difficulty in scheduling the on-site reviews and, therefore, believed backup candidates might be necessary. Fortunately, this was not the case.

Fifty of the distribution cooperatives were selected from the NRECA list using a random number generator. The fifty were randomly ranked and the first ten selected as primary candidates. The remaining cooperatives were alternates.

In summary, a random process was used to select the following list of primary candidate organizations: 36 total organizations; ten small municipals (less than 5,000 customers), ten larger municipals (5,000 to 40,000 customers), ten distribution cooperatives, five small to mid-sized IOUs, and 1 IPP.

II b.   Confidentiality and Anonymity Concerns

An initial concern of the review team was whether there would be considerable resistance to the on-site review process from the selected organizations. When the project was first announced at a NERC Y2k workshop in May 1999, there was considerable discussion devoted to whether or not organizations would voluntarily participate in such a review. The major concerns were in regard to confidentiality of information:

1.   Would the identity of the review participants be protected?

2.   If an organization did not fare well in the audit, would it be singled out in the report to DOE?

3.   Would specific information about the participants that might be considered confidential be included in the report to DOE?

To address these concerns, a confidentiality letter was written by NERC President Michehl R. Gent. This letter requested cooperation by those selected to participate and confirmed that the identity of each participating organization would be protected. The letter was widely distributed by NERC, APPA, and NRECA. A copy of the letter is included in Exhibit III. The review team also used this letter in the initial contact process with the selected utilities.

APPA and NRECA were helpful in addressing these concerns and obtaining the cooperation of their members (and non-members). APPA contacted their members selected for the on-site reviews to encourage participation. NRECA wrote a letter to their members regarding the on-site reviews and also held discussions with individual selected distribution cooperatives. These actions greatly alleviated the concerns of those selected and provided a positive basis for the reviewers' initial discussions with the selected utilities.

All utility information that was used to determine the Y2k readiness status of the utilities was treated as confidential. No copies were made of utilities Y2k documents by the review team.   No information was taken from the review site without permission of the utility being reviewed.

III.   Overview of On-Site Review Process

III a.   Scheduling/Staffing On-Site Reviews

The process was initiated with a telephone call to the utility Y2k program manager using the Telephone Call Form as a guide. This call was used to explain the purpose of the visit and to set up mutually agreeable dates for the on-site review. During the phone call the following items were discussed:

- project objectives

- confidentiality of information

- information that would be sent to them in advance

- possible review dates and what was required from them

- the fact that the Y2k on-site review would serve as an independent validatation their Y2k project efforts

III b.   Information Packet

After the on-site review dates were set, an information packet consisting of a confirmation letter, an on-site review agenda and a Y2k information checklist was sent to the Y2k program manager. A copy of the NERC letter explaining the project was sent as well, if requested by the Y2k program manager.

A follow up call was then made to verify that the information packet had been received, to answer any questions about the information, and to discuss the assessment process in more detail. It quickly became apparent that most organizations were opposed to sending Y2k program information to the review team beforehand, requiring the Y2k project documentation review take place on-site.

If the organization maintained a web site with Y2k information, it was reviewed prior to the on-site review. For the most part, web sites contained only general Y2k information. However, most organizations were publishing more specific information regarding their Y2k readiness as they completed their Y2k work.

III c.   On-Site Procedure

The on-site review was guided by the meeting agenda, starting with the introduction of the organization's Y2k project team, senior management involved with the organization's Y2k efforts, and the on-site review team. The initial discussion provided a background, objectives, agenda topics, and estimated timeframes for completing on-site review items to ensure everyone had a good understanding of the review process and what was required of the organization's Y2k project team.

The on-site review team and the utility representatives then worked out a schedule for interviews and reruns of Y2k tests to be conducted in the course of the review. The purpose was to assure that relevant personnel and other necessary resources would be available without undue disruption to regular schedules and activities.

The organization's Y2k strategy was then reviewed to characterize and understand the structure employed by the organization for their Y2k project. There are numerous strategies that can lead to a successful Y2k program. It was important for an organization to select a strategy for which they had the expertise and resources to support throughout the project. The on-site review

teams used the Y2k Readiness Strategy Checklist to lead and document the discussion. The checklist covered the following areas:

- Awareness/Problem Definition

- Inventory

- Project Organization

- Assessment

- Remediation

- Testing

- Contingency Planning

- Y2k Outreach Services

- Overall Elements

- Risk Management and Due Diligence

Each of these areas has specific elements that could be check-marked during the discussion to enable the project team to characterize the Y2k strategy. The checklist served an important guide to understand the rest of the on-site review results.

The next step was to gather detailed information about the Y2k program. This was accomplished with the *Y2k Electric System Readiness Assessment On-Site Review Document* (See Exhibit I). This guide contains 22 questions to assess the approaches and current status of the organization's Y2k program.

These first three steps (introductions, Y2k strategy review, and initial readiness assessment) generally required the first morning of the on-site visit. This portion of the visit was generally accomplished in a large group with the entire on-site review team and the organization's Y2k project team. The organization's senior management often sat in on these sessions, but that decision was left to the utility.

The remainder of the on-site review process investigated how well the information presented at that time was supported by the interviews, Y2k testing, and documentation. The review team confirmed the tests to be rerun for the purpose of authentication by the on-site review team. A schedule of interviews was also established.

Since the tests of interest to the team were associated with mission critical electrical facilities, it was difficult in some cases to schedule re-tests. Because some of the test of mission critical facilities would have required a maintenance outage and the reviews were performed mostly during a summer peak period, the review team was not always successful in setting up re-tests of mission critical facilities. Utility staffs were generally supportive of the requests by the on-site review team, with only one organization stating it did not have sufficient manpower available for a re-test due to storm damage repairs.

Next, the on-site review team examined the organization's Y2k project documentation. This work was divided among the review team members, depending on the amount of information. Typical documents reviewed included:

- Y2k Project Plan and Schedule

- Y2k Inventory Lists

- Assessment Summaries and Research

- Project Budgets and Adjustments

- Remediation Tasks and Status

- Departmental Activity Reports

- Y2k Team Meeting Minutes

- Status Reports to Senior Management and Board

- Testing Methodology, Targets and Results

- Communications with Key Suppliers and Customers

- Vendor Assurances and Testing

- Contingency Plans

- Internal or External Y2k Audit Reports

- Legal and Risk Assessments

- Overall Project Chronologies or Diaries

- Y2k Reports of Power Suppliers

- Staff Training Activities

After completion of the interviews and re-running of selected Y2k tests, the on-site review team caucused to share information from all the on-site review elements, analyze the results, and develop conclusions as to the Y2k readiness of mission critical facilities and functions at the organization.

Although considerable variation existed among sites due to utility size and complexity, the following timeline shows how a typical two-day session was conducted using two reviewers:

Typical Time Devoted to
Y2k Readiness On-Site Review Per Agenda Item

	Elapsed Time (hours)	Engineering (hours)
1. Introduction – Utility Welcome and Project Overview	1.5	3.0
2. Meet with Y2k Project Team – Strategies Deployed, Project Information, Statuses and Concerns	2.0	4.0
3. Y2k Project Review – Document and File Examination and Discussions with Y2k Team Members	4.0	4.0
4. Interviews with Staff and Re-tests.	4.0	4.0
5. Analysis by the Review Team – Application of Review Criteria to Gather Results and Develop Conclusions	3.0	6.0
6. Meeting Wrap Up – Present Results to the Y2k Team and Senior Management, Answer Questions and Suggest Next Action Items	1.5	3.0
Totals	16.0	24.0

Guides used during the testing review and the operational staff interviews can be found in Exhibit I.

III d.   Evaluation Criteria

The evaluation criteria for the on-site Y2k readiness assessment were:

- Level 1: Not all mission critical devices and systems will be Y2k ready by June 30, 1999 and some may not be Y2k ready by December 31, 1999.
- Level 2: Not all mission critical devices and systems will be Y2k ready by June 30, 1999 but all are likely to be Y2k ready by December 31, 1999.
- Level 3: All mission critical devices and systems are Y2k ready by June 30, 1999 and the organization should remain Y2k ready on December 31, 1999.

The review team rated all of the project documentation for completeness and the thoroughness. Documentation from suppliers and vendors was also reviewed. Testing information was reviewed for completeness and quality of written test procedures and documentation of the test results. Project procedures for tracking inventory, remediation and testing of mission critical devices and systems were evaluated and rated. Project meeting minutes and project reports to management were rated based on the Y2k project plan and Y2k project strategy.

Interviews with key personnel were compared to see if there were contradictions between statements made by the interviewees and the Y2k program members. Lastly, the reviewers compared their notes with the project documents to ascertain if there were any discrepancies between the project documents and statements made by utility personnel during the on-site review.

Based on the above analysis and discussions, the review team would arrive at an initial rating of Level 1, 2 or 3. The review team would then consolidate the reasons for the rating into an outline of findings. Once the on-site review team agreed on the rating and findings, the final evaluation was prepared for discussion with the Y2k program manager. In addition, a list of observations regarding the Y2k program was prepared for discussion with the Y2k program team and senior management.

In applying the evaluation criteria, some judgments were required by the on-site review team. If there was a workaround to a Y2k problem that could be incorporated into the ongoing operations without invoking a contingency plan, the organization could be deemed a Level 3. These workarounds, for the most part, affected cosmetic issues, such as a wrong date in a log, but did not affect the operational capability of the device or system.

III e.   Presentation of On-Site Review Results to Utility

The on-site review team presented their analysis and conclusions resulting from the review to the organization's Y2k program manager. Additional observations were frequently offered to assist the organization in its Y2k efforts, although these observations did not affect the review team's conclusion as to the organization's Y2k readiness status. Observations usually addressed recommended improvements to project documentation, coordination, contingency planning efforts, testing, and vendor assertions of Y2k readiness.

The Y2k program manager was provided an opportunity to respond to comments or conclusions made by the review team. Based on the outcome of the meeting, the Y2k Readiness Evaluation, with supporting information, was completed for signature by the Y2k program manager and the review team. The Y2k program manager retained a copy of the Y2k readiness evaluation for the organization's files.

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The final results of the on-site review were then presented in a wrap up session to the organization's Y2k project team and senior management. The Y2k Readiness Evaluation (see Exhibit I) was presented along with the supporting statements that were in the form of bullet items on the evaluation sheet. A question and answer session followed, and any remaining actions were detailed. This completed the on-site review process.

IV.   Y2k Strategies and Organization

The results of the on-site reviews showed a clear distinction between the Y2k strategies of the largest entities visited (five largest municipals, six IOUs and the largest cooperative), when compared to the remaining smaller entities. The larger utilities used formal Y2k project teams reporting to a Y2k program manager, while the smaller utilities relied heavily on one individual for their Y2k projects. The larger utilities had a decentralized project approach, which relied on the knowledge and expertise of the existing organization's operational areas. While this was the best utilization of resources, it caused difficulties in consistency of project work and project reporting. Without close managerial and procedural coordination, inconsistencies in inventory, remediation and testing could be seen between the different areas within the organization.

The strategies deployed to address Y2k issues at the selected utilities varied considerably in approach but not in effectiveness for achieving readiness. Many differing strategies were found to be effective if they were matched to the characteristics of the utility, fit with the skills of the Y2k program manager, and received strong support from management. The strategy deployed by a given utility could often be cited as a reason for extraordinary performance but rarely was it the cause of a readiness deficiency. Some strategies were begun earlier and were more deadline-driven than others. However, the principal determinant in whether the organization met the June 30, 1999 readiness date was program execution and timely cooperation of the utilities' supplying vendors. In other words, Y2k strategies are an important means to characterize the programs from utility to utility, but they are not the best indicator of a successful program.

Among the larger utilities in the sample, the program organizational direction and information flow characterized their programs. Though many of the programs started with an organizational philosophy, most program managers ended up deploying hybrid organizational strategies. These organizational strategies can be characterized as:

- Top down vs. bottom up

- Centralized vs. decentralized

In the cases in which outside expertise was used to drive the program, these strategies were mostly top down, centralized approaches. These programs tended to be successful due to the expertise deployed rather than the directional strategies practiced.

The bottom up, decentralized approaches were most successful when functional area or departmental managers had the expertise to carry their part of the program and could achieve consistency through the existing interdepartmental processes within the company. By relying on these internal experts, programs could often by streamlined if everyone "carried their weight". In this model, the Y2k program manager is there to consolidate results. Again, unevenness in program execution and unreasonable trust in vendor completion deadlines led to performance problems rather than any particular strategy used.

Most programs were organized centrally from the standpoint of having the Y2k program manager reporting to a Chief Executive Officer or other top executive. At the same time, most programs were decentralized with the Y2k team consisting of departmental managers or area experts. Figure 4.1 shows the responses the on-site reviewers found when asking about project organization and strategy.

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Number of Responses
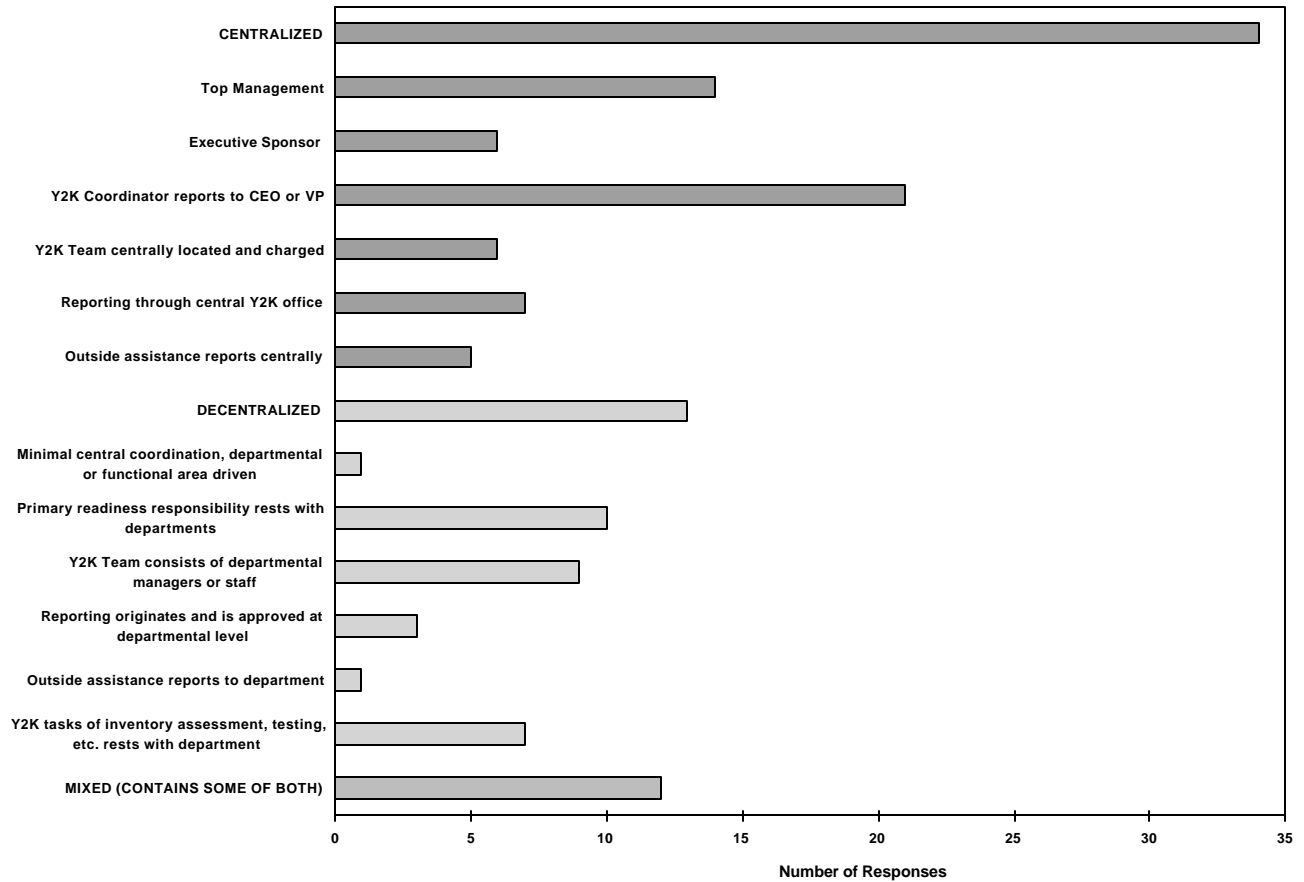
Figure 4.1 Organization of Y2k Programs

Strategies ranged from an investor owned utility that comprehensively deployed hybrid strategies followed by internal and external program audits, to a small municipal where one person literally "did it all" by relying on detailed knowledge of the system and key suppliers. While each of these utilities scored a top ranking, they illustrate diversity in approach and a range of complexity common through the sample utilities.

There were three management types observed in the Y2k programs visited. In at least two small municipals, the electric department had a leadership role in managing the citywide response for Y2k. In one case, the electric superintendent had learned of the issue through a statewide association of municipal utilities and alerted the city staff to the issue. In another city, the electric superintendent was also the city Y2k coordinator. In the latter instance, when the review team's final report was presented, it was to the city Y2k committee, which included the police and fire chiefs, representatives from every city department, and representatives from the hospital and National Guard armory (which had been planned as the city's emergency relocation-site). The city manager and city clerk also attended the presentation.

In other cities, someone directly reporting to the city manager managed the Y2k effort on a citywide basis. In one small city, the city manager served as Y2k coordinator, with the support of a consultant. In the remaining cities and in all the cooperatives, the IOUs and the IPP, management of the Y2k effort was at the utility level. In the IOUs and the IPP there were usually one or more "executive sponsors" who reported to the CEO. In the municipals and cooperatives, there

was always a high level executive participating in the effort, such as the department head, superintendent, general manager, or similar level executive. For example, in one cooperative the Y2k program manager was also the Chief Financial Officer, supported in technical areas by the Director of Engineering/Operations.

Utilities that engaged consultants specifically for Y2k tended to have more formalized programs and were more organized in documenting their projects. Smaller utilities that did not engage consultants tended to have more informal programs and documentation, although there were instances of well documented, formal programs based on information gathered from the activities of the G&Ts, multi-municipality agencies, and power suppliers, as well as the material provided by APPA and NRECA.

Besides the issue of available expertise, the next greatest influence on Y2k program strategy was how the utility developed an awareness of the problem and defined its impact on the organization. While all programs had multidimensional goals, one or more of the following could be attributed to each program:

1. Y2k issue primarily exists elsewhere, outside of the utility.

2. Issue is one of public perception and reaction.

3. Issue is technical with computer, software and embedded systems.

4. Issue of communicating with regulators and customers.

5. A business issue that could affect the well being of the organization.

6. Societal issue that threatens social fabric – our utility has a role to maintain it.

7. Issue is very difficult to define and keeps changing as we approach the Year 2000

All programs defined the key issue as technical with computers, software and embedded systems (number 3) but varied in the extent of how the other issues affected their program. Figure 4.2 Initial Utility Definition of Y2k Problem shows the range of responses the reviewers heard when they asked how the utility has defined the Y2k issue.
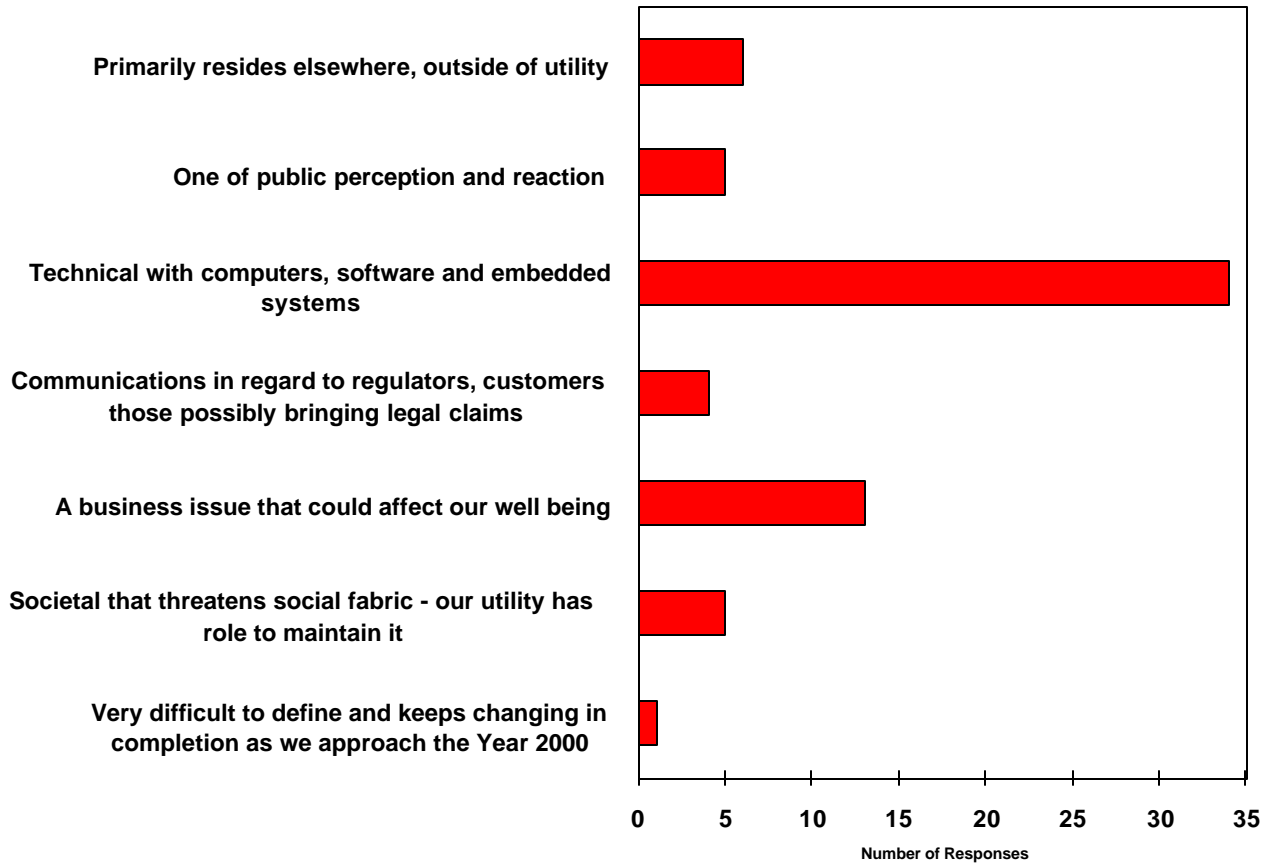
Figure 4.2 Initial Utility Definition of Y2k Problem

Y2k program strategy was also influenced by the stage of program completion. The on-site review team was presented with an opportune time (June – July 1999) to look at these utility programs. Most were already through the inventory, assessment and remediation stages and were in the midst of final testing, quality control and contingency planning. These programs could be characterized by their current strategy of "buttoning up" program completion and contingency planning. The program managers were confident in their utility's Y2k readiness for mission critical systems and had turned their focus to non-mission critical systems, follow-up testing and contingency planning. Due to the timing of the visits, program managers were able to reflect on their past program strategies and note how their strategy had changed over time.

V.   Y2k Program Procedures and Practices

There was substantial commonality among all the utilities reviewed with respect to the project steps they followed. The larger the utility the more likely it was they would relied on resources other than the project team for quality control. This included internal and external auditing of the Y2k project. Even though the project steps were common, the scope of the project steps was on vastly different scales between large and small utilities.   For example, a small utility may have only a few items in the Y2k inventory, while a large utility may have many thousands of items in the Y2k inventory.

Y2k project stages followed conventional methods that were sometimes different slightly in order and name but in practice were very similar among utilities. The strategies deployed and results achieved within each of these stages tell the readiness "story" for each utility. For purposes of this report, the stages are as follows:

1. Inventory

2. Assessment

3. Remediation and testing

4. Quality control

5. Contingency plans

6. Suppliers

To have a common definition of these steps or stages, the on-site review team drew upon the Y2k guidelines issued by NRECA and APPA entitled *Guidelines for Public Power Utilities to Confront Year 2000 Problems in Embedded Systems*[3]. Paragraph excerpts from the Guidelines contain these definitions with examples and clarifications as supplemented by the review team.

Inventory
In order to ensure reliable electric service through the Year 2000, the first step is for an inventory to be conducted of devices or systems that are both service critical and microprocessor based. Sources for this information may be derived from utility staff, engineering studies, work order results, field inventory and mapping systems. The more specific the inventory, the better the chance of obtaining helpful vendor information and cross checking with known problematic devices. A thorough inventory will collect the total number, vendor name, model number, version number and, if possible, manufacturer date and serial number of devices.

Assessment
The second step for ensuring reliable electric service through Y2k is to assess the severity of the Y2k challenges for a utility, to "keep the lights on," and to maintain communications with the utility's customers. Vendors should be contacted for compliance information on the inventoried items, asking for compliance statements, test procedures, and how one can directly verify the results in the utility's location.

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[3] APPA, Guidelines for Public Power Utilities to Confront Year 2000 Problems in Embedded Systems, October 1998.

Remediation and Testing

Answering the questions of what prudent actions should be taken and "how can one be sure" are elements of the third step, remediation and testing.

Remediation approaches include:

- Communicating

- Fixing, repairing, and remediating

- Device/system upgrading or replacement

- Mitigating, coping

- Retest

Performing verification testing or obtaining results from a reliable third party will be necessary, especially for critical systems made from a variety of vendor components that, in combination, are unique to the installed systems. The reviewers' testing should verify vendor results and check for system interrelationships for date handling.

Testing at the device level may be necessary early in a Year 2000 program and again at a system level once component fixes have been made.

Quality Control

Ensuring that the Y2k project receives the necessary oversight to certify that the methodology and results conform to industry standards and practices for similar projects. This requires an independent quality group inside and/or outside the company to perform this function.

Contingency Plans

Planning for contingencies requires asking, "what if things go wrong". This step considers preparations needed if Y2k problems occur. Contingency planning covers:

- Staffing for key dates
- Problem identification training
- Work-around, alternatives
- Supplier communications
- Customer contacts
- Staff communications
- Public communications
- Follow-up remediation

Suppliers

Y2k solutions are a challenging for electric utilities because of the interdependency of distribution, transmission, generation, and other suppliers. Although individual hardware and software components may be deemed 100 percent compliant, an electric distribution utility by its nature *can only achieve a high state of readiness in conjunction with its suppliers*. Some problems will occur, which will hopefully be minor due to the combined readiness efforts of utilities and their suppliers.

Variations in procedures and practices within each of these project steps can be generically categorized across all the sample utilities. The reviewers used a "Checklist for Utility Program Review Y2k Readiness Strategies" contained in

Exhibit I as a means to document these approaches. Figures 5.1 through 5.9 summarize these results followed by comments in each area.
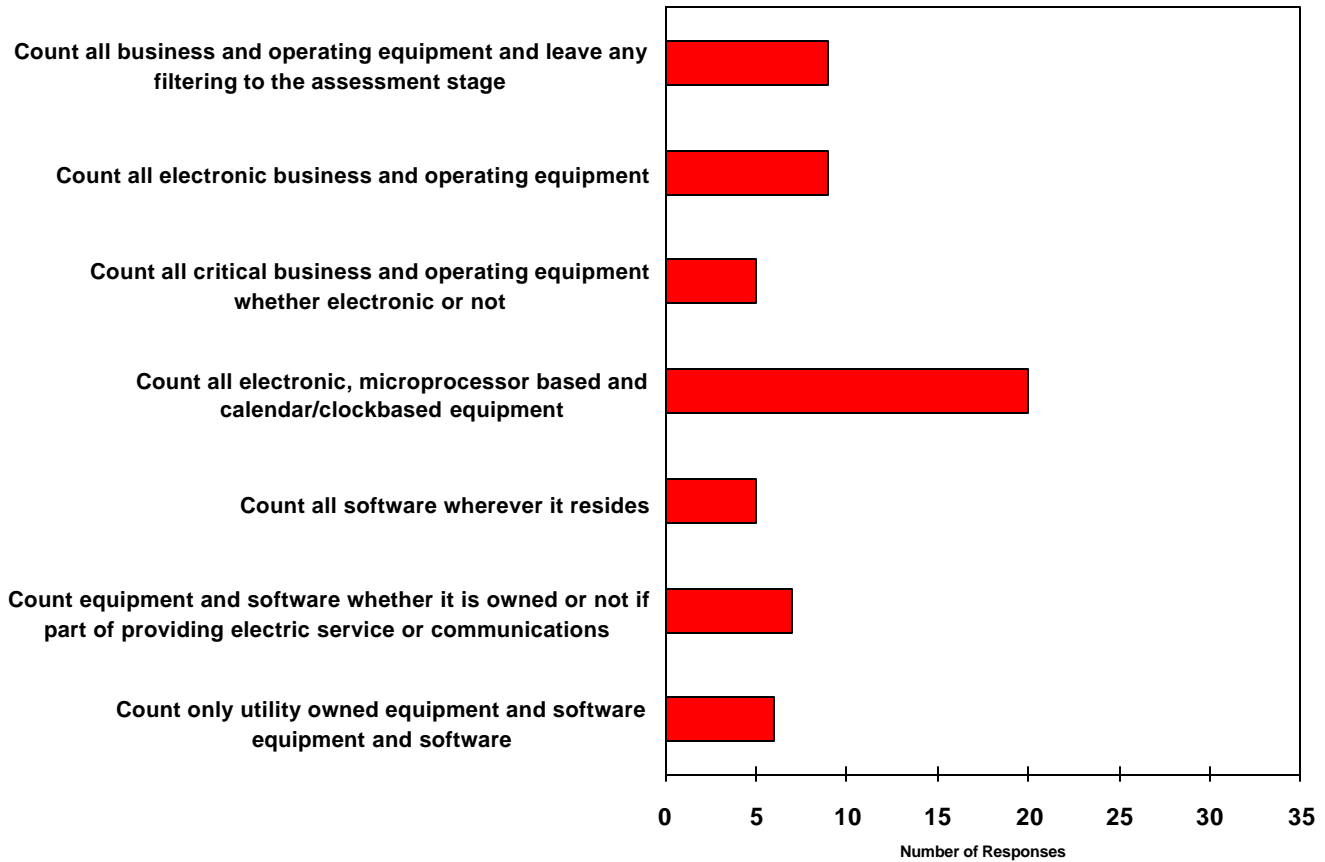
Figure 5.1 Method of Utility Equipment and Software Inventory

The sample utilities went about counting their equipment and software from a variety of viewpoints. Figure 5.1 shows microprocessor based and clock/calendar based counting as most common.

Inventory items screened and prioritized by service criticality

Inventory items screened and prioritized by reliance on clock calendar

Inventory items screened and prioritized by interconnectedness/part of larger system

Compliance information obtained by letter campaign

Compliance information obtained by vendor websites

Compliance information obtained by industry databases

Compliance information obtained by other utilities/joint efforts

Compliance information obtained by self-checking and testing

0   5   10   15   20   25   30   35

Number of Responses

Figure 5.2 Assessment of Equipment and Software Inventory

Figure 5.2 shows that the utilities reviewed used multiple methods to prioritize and assess the Y2k vulnerability of items in their inventory.

Doubt need, test specific perfomance

Develop workaround

Patch and fix

Upgrade

Replace

Redesign system and work processes 0

Number of Responses
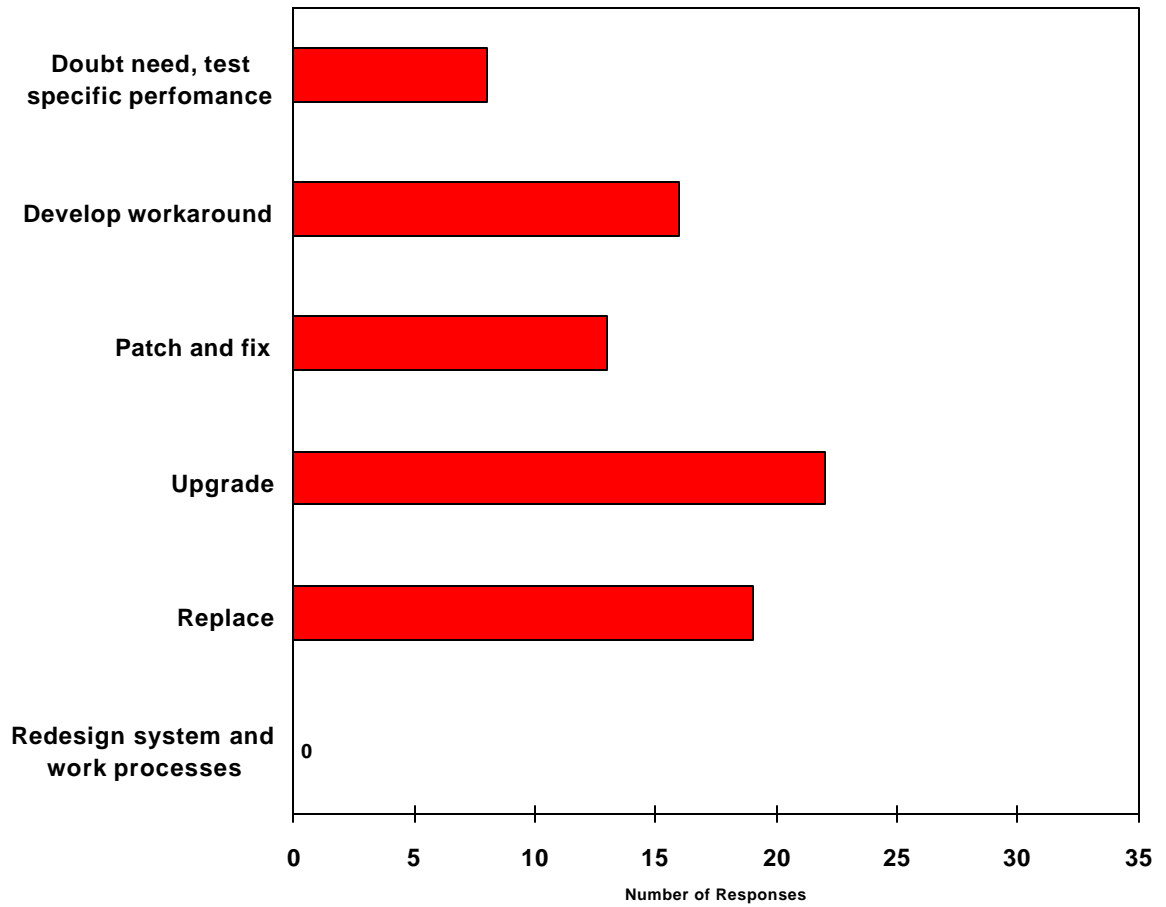
Figure 5.3 Plans for Y2k Problem Remediation of Equipment and Software

Remediation strategies were often dictated by issues of aging and cost rather than strictly by the severity of the problem or risk. Figure 5.3 shows the pattern of remediation among the sample utilities.
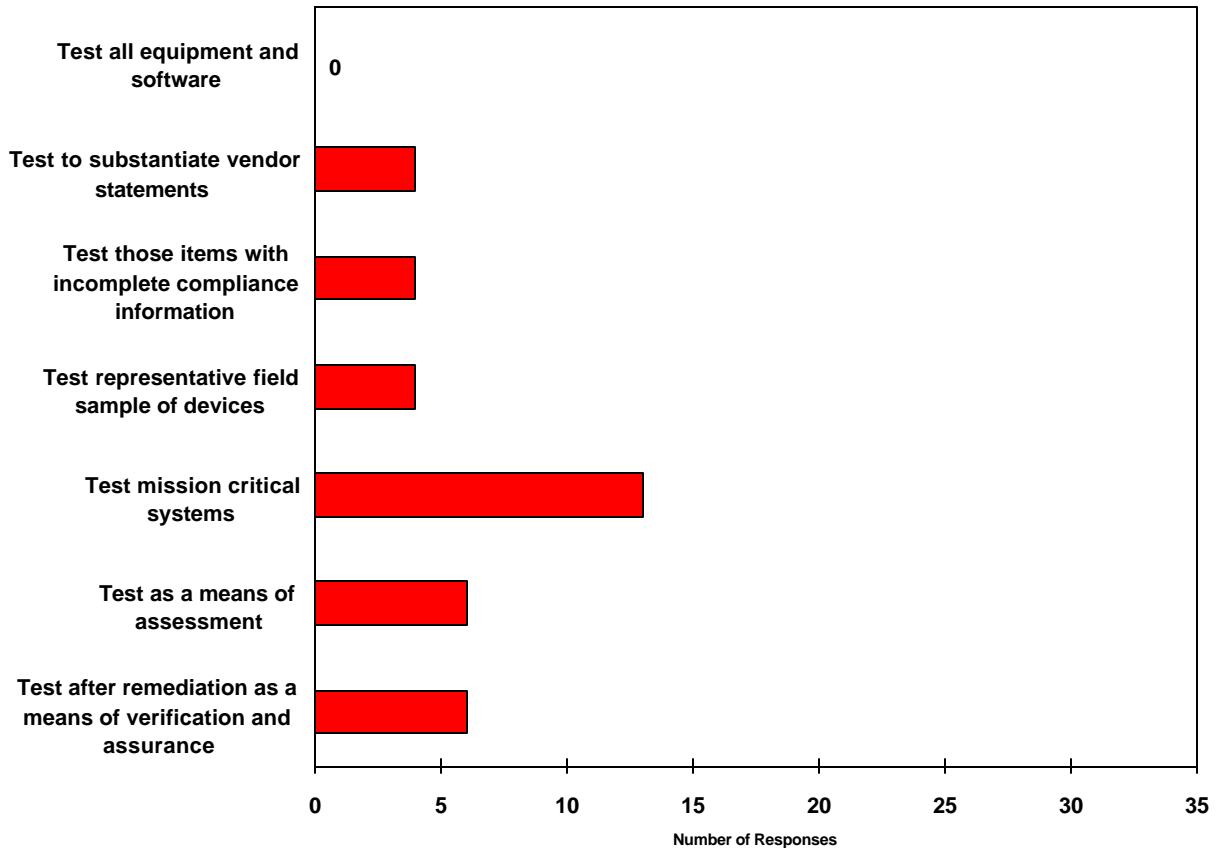
Figure 5.4 Targets and Purpose of Testing of Y2k Affected Equipment and Software

Figure 5.4 indicates that testing was most frequently focused on potentially problematic mission critical systems. The on-site review team analyzed the testing strategies more deeply and arrived at the following conclusions:

- 80% of the smaller municipal utilities performed no Y2k testing. This can be attributed to the fact that these utilities did not have digital equipment.
- 50% of the larger municipal utilities and 40% of the cooperatives implemented a low level test method, usually only involving the December 31, 1999 to January 1, 2000 rollover test with power-on. These utilities were either unaware of other potentially problematic dates or thought that this level of testing was sufficient evidence that the tested devices would not encounter Y2k problems.
- 20% of the cooperatives, 10% of the larger municipal utilities, and several of the investor owned utilities used a medium level of testing, consisting of assessing proper operation on the better known potentially problematic date transitions, including 9/9/1999 – 9/10/1999, 12/31/1999 – 1/1/2000, 2/28/2000 – 2/29/2000, and 2/29/2000 – 3/1/2000. This level of testing typically included more than one test per date, such as a power-off rollover (when applicable) as well as a power-on rollover.
- Several of the investor owned utilities completed a full suite of test dates and multiple test procedures per date, such as: reboot date retention test, power-on rollover, power-off rollover, and manual date set test.

The on-site review team observed re-tests, mainly focused on SCADA/EMS systems and digital relays. Major observations were that there were more problems with SCADA/EMS systems. No digital relay failed to pass a Y2k test witnessed by the on-site review team. There were instances where it was suggested to the utility that additional dates be tested. Only the five largest municipals and all of the IOUs had SCADA/EMS systems that were mission critical.

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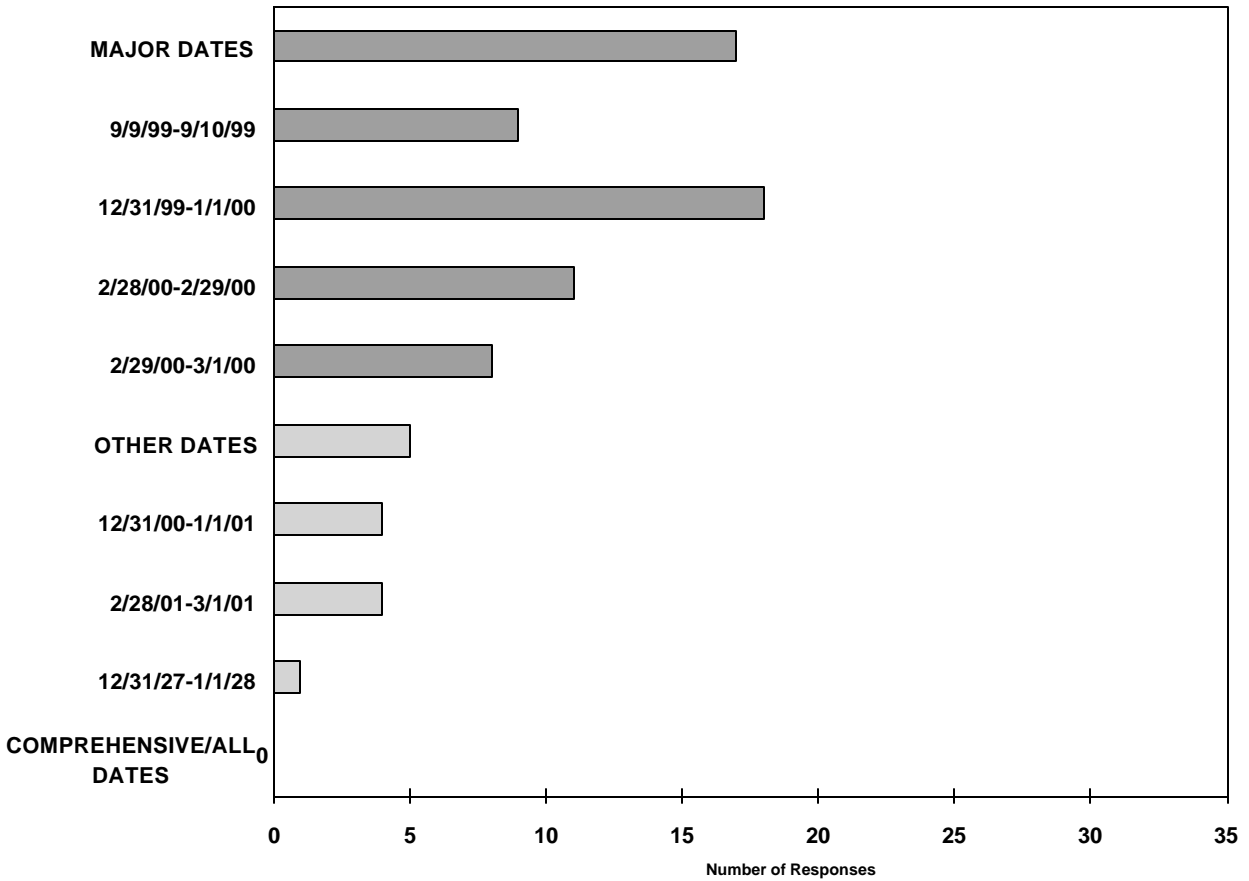
Figure 5.5 Key Date Testing of Y2k Affected Equipment and Software

When testing, most of the sample utilities check 12/31/1999-1/1/2000 and to a lesser degree the other dates. Figure 5.5 shows a mix of the test dates used. No utility reviewed was determined to be using all test dates known to the on-site review team.
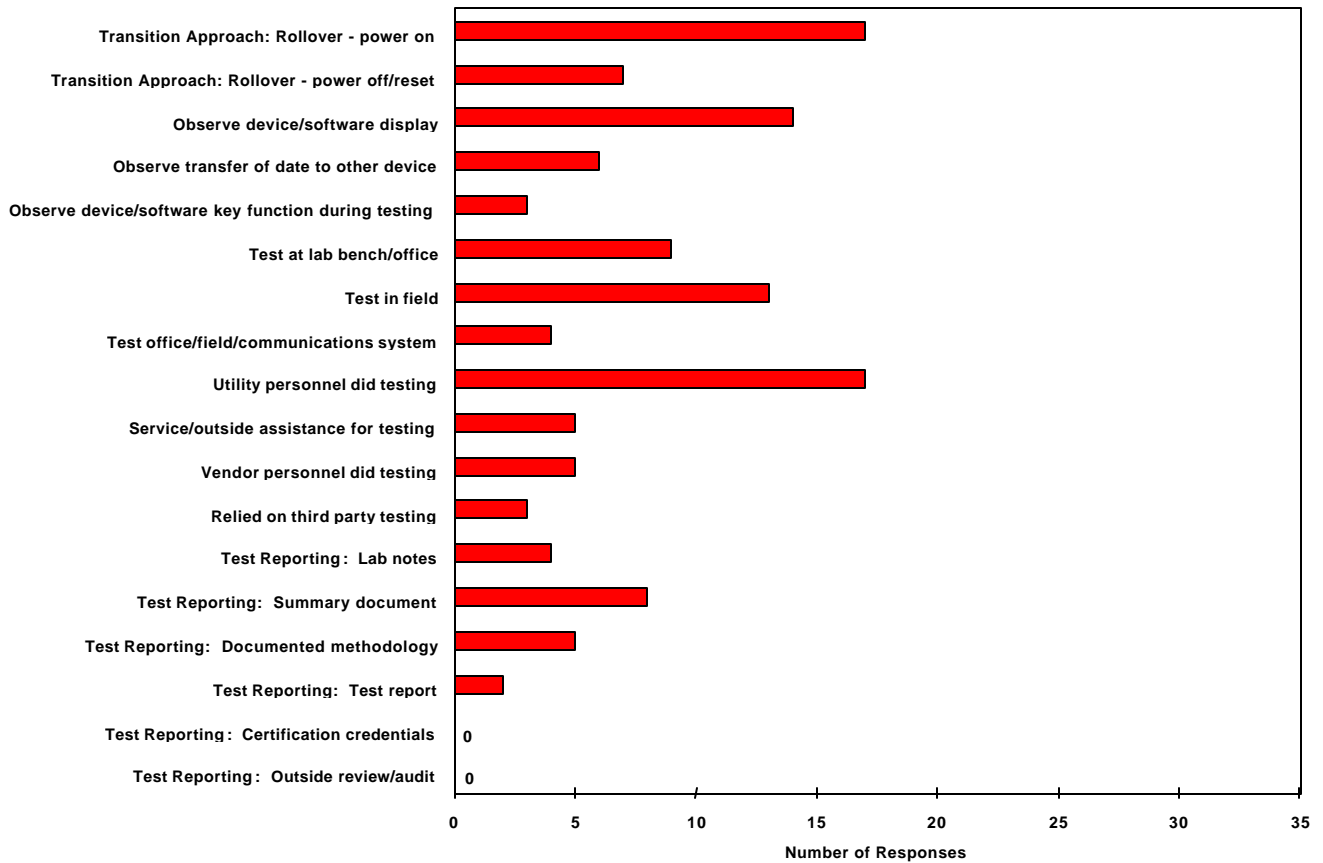
Figure 5.6 Testing Methods for Y2k Affected Equipment and Software

Testing took on a variety of attributes at the sample utilities, with most using their own personnel to conduct rollover testing in the field. Testing methods depended greatly on the sophistication of the entity reviewed.
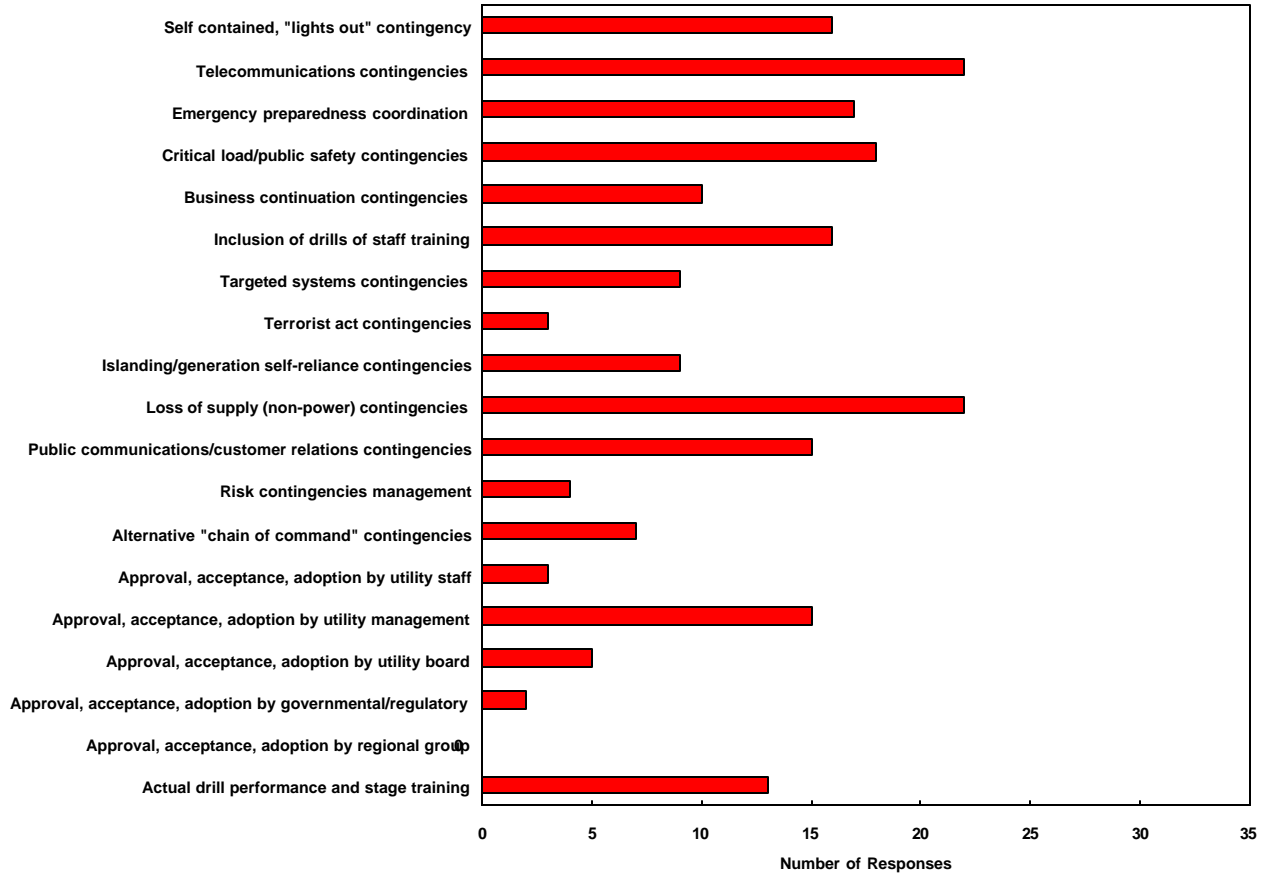
Figure 5.7 Elements of Contingency Planning

Contingency planning was an ongoing process in most of the reviewed utilities with broad attention given to many contingency topics. The items in Figure 5.7 served as a checklist of contingency plan comprehensiveness.

A Year 2000 Disclosure
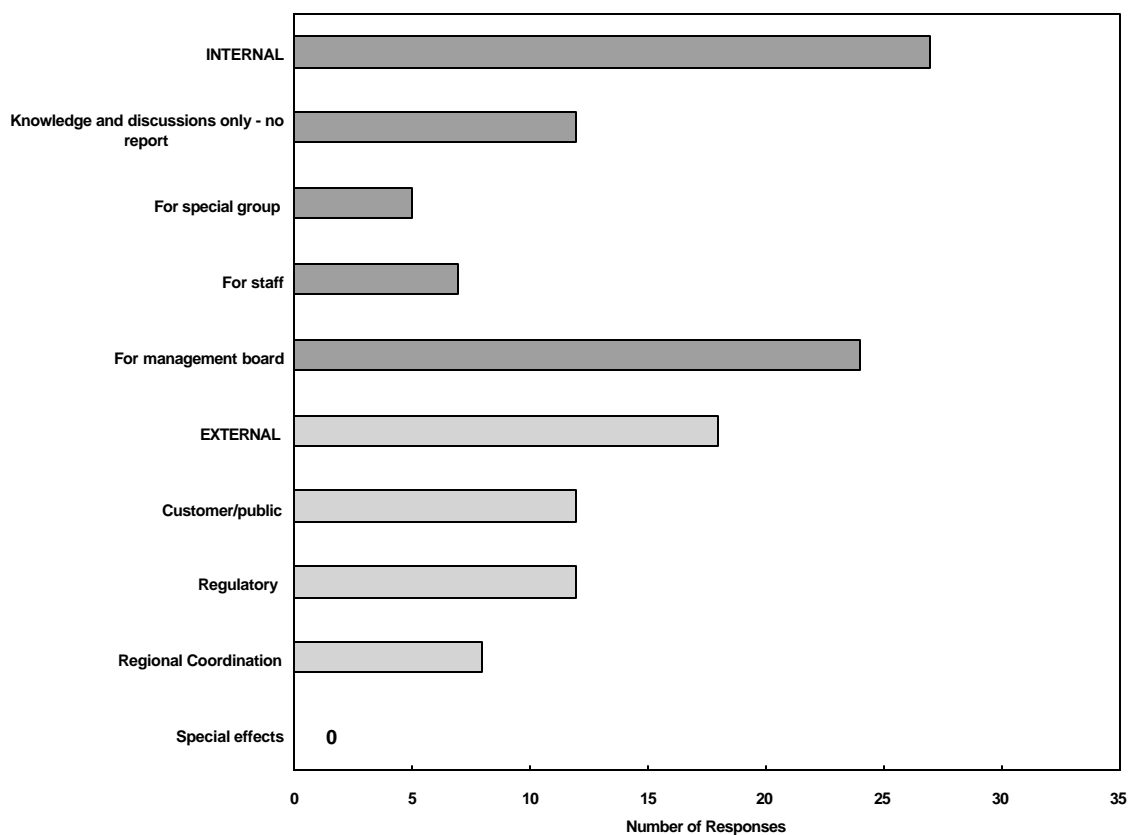
Figure 5.8 Purpose of Y2k Project Reporting

The sample utilities reported primarily internally on their Y2k programs yet also recognized their external audience. Figure 5.8 shows the utilities reviewed provide Y2k information to a variety of internal and external stakeholders.
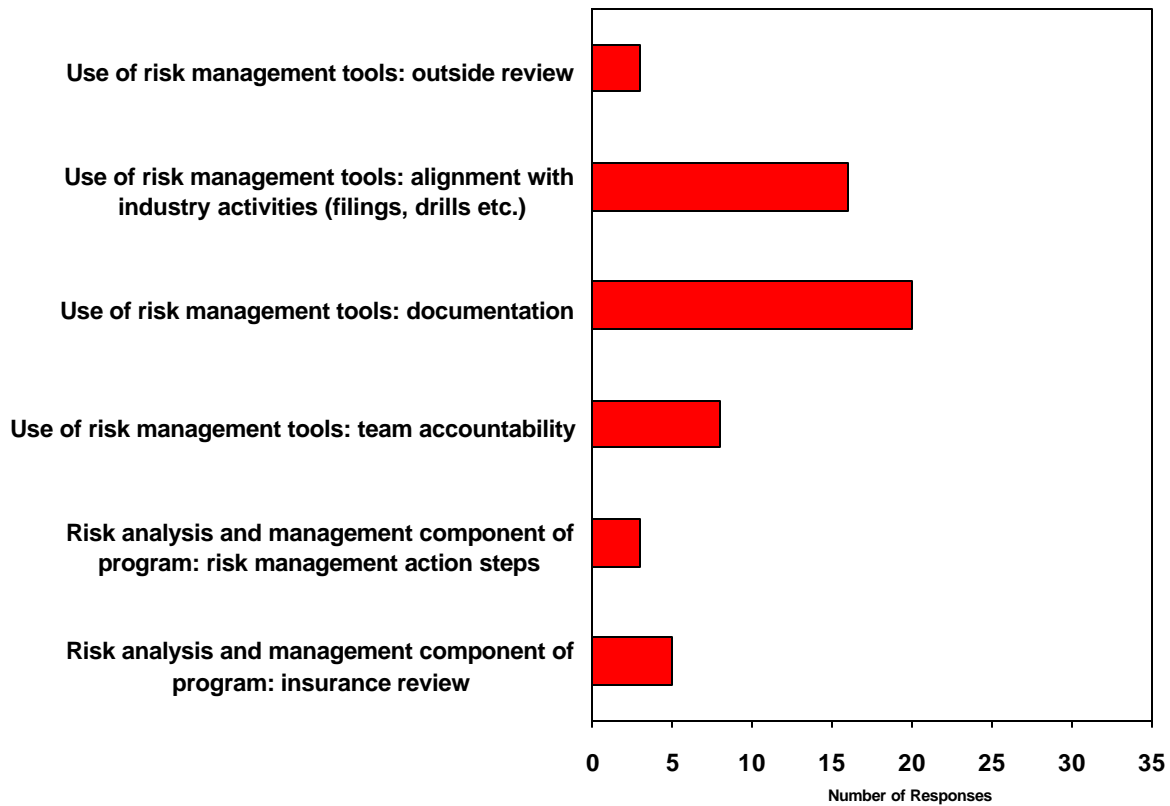
Figure 5.9 Purpose of Risk Management and Due Diligence Information

Figure 5.9 indicates documentation led the way as the tool for primary risk management strategy, followed closely by alignment with industry activities.

Generally, if Y2k programs encountered difficulties it was in the later steps of the program, primarily in remediation and testing. The inventory and assessment steps, although completed with a variety of strategies and methods, were found to be complete and consistent with the utility size and complexity.

Remediation and testing encountered difficulties, principally as a matter of vendor reliance rather than flaws in the program. Remediation gaps were found primarily in SCADA and customer information systems where vendors slipped on their delivery and installation schedules, moving readiness into the third quarter of 1999. Testing difficulties were either a matter of over reliance on the vendors' testing or a lack of clarity of the suitable testing methods necessary to verify vendors' claims.

All utilities reviewed were in the process of developing contingency plans with drafts for the review team's evaluation. A great range of creativity was shown in the development of these early plans. The small utilities were deemed to be doing well in developing emergency procedures matched to their previous storm experience and characteristics of their systems. Most contingency plans required additional attention and, in particular, "buy in" from operations personnel.

VI.   Summary of On-Site Review Results

VI a.   Composite Entities

In order to protect the confidentiality of the Y2k information supplied to the review team during the on-site reviews, the results are reported on an aggregated basis in this report. In addition, the individual utility reports resulting from the on-site reviews are presented in Exhibit IV in a manner that does not disclose the identities of the organizations.

The results are reported for the following categories of entities reviewed:

- Small Municipals (less than 5,000 customers)
- Larger Municipals (5,000 to 40,000 customers)
- Distribution Rural Electric Cooperatives
- Small to Mid-sized Investor Owned Utilities
- Independent Power Producer

VI b.   Small Municipals

There are 1,234 municipals in the United States with less than 5,000 customers. This is a large number of organizations, but these organizations account for less than 5 million customers. Y2k failures in this group would have local impacts the organization's customers, but would not impact the reliability of the bulk electric grids. These small municipals for the most part offer only distribution services. If they have generation, those units are small and are not likely to be in service every day. These units are typically used only for emergency power, but could be put into service during the Y2k transition to supply service to some or all of their customers in case of failures by the wholesale power suppliers. Most of the municipals are dependent on their wholesale power suppliers for generation.

The ten small municipals in the sample ranged in size from approximately 300 to 4,000 customers. They serve small towns across the United States. Their peak loads are between 1 MW and 27 MW. Some are summer peaking and others are winter peaking.

The governance of these municipal utilities varies. Most commonly, the municipal superintendent reports to the city manager, mayor or a utility commission appointed by the city council.

These small municipals rely on very small staffs to run the organization and they tend to rely heavily on staff knowledge and experience for day-to-day operations. They often have one to three substations from which they distribute power to a mix of residential and commercial customers, with in some cases a few industrial customers. Industrial customers, when present, can account for a large portion of the load.

Generally, small municipals operate their systems manually with very little digital automation that may have Y2k dependencies. "We don't have anything to test!" Several small municipalities (and cooperatives) made this comment when reviewers asked to see their Y2k test records. In most cases these utilities have chosen not to stay on the leading edge of technology and have not upgraded their systems with microprocessor controlled devices. Also, some small utilities do not own the substations that serve their customers and do not have line devices such as voltage regulators or overcurrent protection equipment that may be microprocessor-controlled on their distribution system.

Electric distribution systems for these utilities can be characterized as having mechanical, non-electronic reclosers, and older analog or electromechanical relays and voltage regulators. Those few that do have newer digital relays have no apparent Y2k date sensitivities affecting electric operations. Similarly, the generation plants for these utilities, when they exist, can be characterized as having 1960's (or older) technology diesel generators, with analog or electromechanical controls and meters.

Other small electric utilities simply do not own the distribution substation equipment serving their customers and have no microprocessor-controlled line devices on their system. Their approach to Y2k readiness is to obtain a readiness statement from their power supplier who owns the distribution substation equipment. The role of these utilities is to maintain the distribution equipment outside the substation, obtain meter readings from customers, and facilitate billing of customers.

In one case where minimal inventory records were available and no plans were in place to expand them, the reviewers' initial rating of Level 1 (worst rating) based on a review of sparse Y2k documentation, changed to a Level 3 (best rating) after inspection of the generation and substation facilities. The inspection revealed that the generators themselves were early 1940's to early 1960's model diesel generators controlled by 1960's vintage equipment. In addition, the single substation serving the system was equipped with little more than a transformer and self-contained, high side protective devices that were mechanical in nature. The utility's electric system obviously did not contain or rely on any date sensitive digital equipment and was therefore assessed as being Y2k Ready.

VI c.   Larger Municipals

There are approximately 780 larger municipals, about 40% of the total for the municipal power segment. These larger municipals serve about 35 million customers. These on-site reviews focused on those municipalities with up to 40,000 customers. Those that are larger report directly to NERC on a monthly basis and are considered bulk electric entities.

In the municipalities with 5,000 to 40,000 customers, Y2k failures would have greater impact than the smaller entities because they serve more customers. Once again, however, the impact would still be minimal on the bulk electric system. This group also showed more diversity in the mix of residential and commercial/industrial customers. This varied from 67% commercial/industrial and 33% residential, to roughly the reverse of that.

The larger municipals are more likely to have their own generation, but for the most part still purchase the majority of their power from others. If they have generation that runs on a regular basis, it is commonly sold to the wholesale power supplier as part of a power supply pool.

The 10 larger municipals in the sample ranged in size from just over 5,000 customers to over 36,000 customers. They serve small to mid-sized towns across the United States. Their peak loads are between 22 MW and 240 MW. Again, some are summer peaking, while others are winter peaking.

The governance of the larger municipals is similar to that of the smaller municipals. The larger municipals require larger staffs to operate their systems. The largest of this group has over 100 employees. It should also be noted that a number of these municipals support more than just electric services for the city. The other services that they are often responsible for include water and wastewater. In the smaller municipals, the operational employees can support all the services offered. In the larger ones, it is more likely that the operational

employees would specialize in a specific service. There is usually a common infrastructure for all customer services, such as billing and new accounts.

VI d.   Rural Electric Cooperatives

Most electric cooperatives came into being during the 1930s to bring electricity to rural America. As stated earlier, the sample includes only distribution cooperatives. In the rural electric model, retail customers are served by the distribution cooperatives. The generation and transmission cooperatives (G&Ts) are responsible for generation, purchase, and transmission of power for their distribution cooperative members.

Many distribution cooperatives own the generation and transmission cooperatives. Some distribution cooperatives, however, are not affiliated with G&Ts and have alternate arrangements for delivery of wholesale electric power. Distribution cooperatives that are members of a G&T typically have seats on the board of the G&T.

A typical distribution cooperative is owned by its retail customers. These customers elect the cooperative's board of directors from among the membership. The chief executive or general manager of the distribution cooperative reports to the board of directors of the cooperative. Cooperatives are not-for-profit organizations.

There are approximately 850 rural electric distribution cooperatives operating in 46 states. They range in size from less than 500 customers to nearly 150,000 customers. Customer service areas are much larger than the municipals reviewed, because the cooperative service areas are usually less densely populated. The ten rural electric distribution cooperatives selected for the on-site reviews range in size from 1,600 to over 93,000 customers. Distribution cooperatives typically have no generation and are dependent on their G&T cooperative to supply power to them. The peak loads of those reviewed are between 6.4 MW and 33 MW. Some are summer peaking and others are winter peaking. In general, the distribution cooperatives' loads are much more residential and farming than those of the municipals. Distribution cooperatives usually operate with small staffs.

VI e.   Investor Owned Utilities

Investor owned utilities (IOUs) are responsible for the vast majority of power that is generated, transmitted and distributed in the United States (about 75%). IOUs may be fewer in number, but they are much larger than most municipals and cooperatives. They also vary greatly in size from 100,000 to over 3,000,000 customers. They can have compact territories or cover large geographical areas.

As the name implies, IOUs are owned by shareholders of publicly traded stocks. Most own generation, transmission and distribution resources. This is changing as deregulation results in divestiture of generation and transmission assets and regional coordinators emerge to operate electric systems. Deregulation is also creating a large number of mergers and acquisitions among the IOUs, as they are looking for economies of scale to compete in the new deregulated market.

With respect to Y2k, most IOUs report directly to NERC on a monthly basis, since they are considered bulk electric systems. To verify the validity of the self-reported information to NERC, five (approximately 2%) were randomly selected for on-site reviews to confirm whether the information they were reporting to NERC was consistent with on-site observations. It was decided to review small

to mid-sized IOUs to be consistent with the focus on smaller electric organizations.

The five IOUs selected for on-site review ranged in size from about 100,000 customers to over 300,000 customers. A number of them have divested their generation resources over the past year. Since the selected IOUs are relatively small, their territories tend to be compact. They serve populated areas with more commercial/industrial loads. Peak loads range between 600 MW and 1450 MW. Most are summer peaking.

IOUs have two types of substations (transmission and distribution). Most have generation that must be transmitted to the distribution substations. The number of substations in the sample IOUs ranges from 33 to 144.

VI f.   Independent Power Producer

With deregulation, the role of independent power producers (IPPs) has continued to increase as they build new generation or buy the existing IOU generation facilities. IPPs represent an increasingly larger portion of the power generation in North America. IPPs vary in size from small companies to large multinational companies. The project team decided to perform one on-site review at an IPP as a reference point for this segment.

VI g.   On-Site Review Results

The table below lists the results for the 36 on-site reviews.

Table 4

Y2k Readiness Evaluations of 36 Electric Organizations

Level 1[1] - Not Y2k Ready by December 31, 1999	Level 2[2] - Y2k Ready by December 31, 1999	Level 3[3] - Y2k Ready by June 30, 1999
0	6	30

The on-site review team determined that all 36 of the organizations visited are very likely to be Y2k Ready prior to the year-end transition. 30 of the organizations were determined to be Y2k Ready by June 30, 1999. The remaining 6 demonstrated a high probability of being Y2k Ready prior to the Year 2000. In fact, all 6 are estimated to be Y2k Ready by the end of the third quarter.

The six receiving Level 2 evaluations (Y2k Ready by the end of the year) were waiting for vendors to complete installation and testing of software to remediate Y2k problems in some mission critical systems, mostly SCADA systems, or were waiting for a maintenance outage to complete remediation work. The schedules available from the vendors pushed the Y2k readiness dates into the third quarter of 1999. This should leave time for the organizations to test and accept the systems for on line operation. All the organizations have contingency plans to bypass these systems if they are not Y2k Ready by the end of the year.

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[1] Company is not likely to meet the NERC Y2k readiness date (June 30, 1999), and may not be Y2k ready by December 31, 1999.

[2] Company has some issues that cause concern for meeting NERC Y2k readiness date (June 30, 1999), but should be Y2k ready by December 31, 1999. There is a need to continue to monitor the company's progress.

[3] Company should meet NERC Y2k readiness date (June 30, 1999) and will be Y2k ready by December 31, 1999.

The following general conclusions were made as a result of the on-site visits:

- The organizations visited had applied the necessary resources (both staff and money) to their Y2k projects to address the Y2k issue as related to delivery of reliable electric power. These organizations exhibited a sense of urgency for the Y2k issue. Funding was not a major limitation in addressing Y2k at any of the organizations visited. Whether it was hiring consultants, repairing or replacing devices, components, or software, the necessary funds were made available. There were instances in which it was decided, based on economic considerations, to use a workaround to resolve a Y2k problem, instead of spending more dollars to repair or replace the item.

- These organizations typically started their Y2k projects later than larger bulk electric organizations, but the magnitude of the Y2k issues is substantially less and manageable.

- The smaller organizations that were the focus of this study have less leverage with critical vendors, such as SCADA vendors. This may be the most significant disadvantage smaller organizations have compared to larger ones.

- There were no known geographic differences encountered in the project. The level of effort was consistent across the country.

VI h.   Additional General Observations

Dependence on Wholesale Power Suppliers

Many of the organizations reviewed were dependent on wholesale power suppliers. This dependency occurred in all categories, including some IOUs that had divested their generation assets. However, some of the municipals had sufficient generation to cover their expected loads at the Y2k transition. This situation created a difference in focus when discussing contingency plans.

If the utility had sufficient generation, some major issues addressed were adequacy of fuel supply and contingency plans for how to operate in the event of an extended power outage. Capability of backup communications with the power supplier was also a consideration.

If the utility was completely dependent on the power supplier, the major issues were quality of backup communications with the power supplier and contingency plans for power curtailment in the event of a power shortage.

An issue identified at one utility, which upon investigation turned out to be more widespread, is a reluctance of some power suppliers to share near-term operational information. Information sharing is regarded as a critical aspect of Y2k readiness, and is included in the April 9th and September 9th drills.

This communication between the power supplier and the utility was brought to light during an on-site review. Due to a summer heat wave, the power supplier had initiated rotating power curtailments. The electric superintendent commented during the review that he was having difficulty finding out from the supplier if his municipal was on the curtailment schedule. The municipal had sufficient generation to cover most of its load, but would need to alert some industrial loads of the likelihood of curtailment. The lack of information from the power supplier created uncertainty and made it difficult for the superintendent to plan his response to the situation.

Mission Critical SCADA Systems

As has been previously stated, a major issue identified in this review was related to mission critical SCADA systems. Not all SCADA systems are mission critical. Some utilities use SCADA for data logging, as opposed to actual control. At one utility there was a non-Y2k Ready SCADA that did not affect the Y2k readiness of the electric delivery systems of the utility. The SCADA was used for two purposes. One was collection of information required for regulatory reporting on a small hydro plant, especially during the night and weekend hours when the plant was unattended. The other was monitoring items such as air pressure in a substation located directly across the street from the utility offices. The loss of these functions would result in at most some minor inconvenience and additional administrative workload for the utility.

The fact that a utility had a non-Y2k Ready SCADA was generally not a reflection on the utility itself. In general, the utilities encountering these situations had strong commitments to addressing the Y2k problem and were otherwise fully Y2k Ready. Two examples will illustrate the issue. In one case, remediation of the SCADA system required a software upgrade. The upgrade had been tested on other utilities' systems and was satisfactory. However, the upgrade required an external vendor team to spend three days at the utility installing and testing the software. The visit by the vendor team was scheduled for late September and could not be advanced because of the vendor workload.

In the other case, the utility had started early on their Y2k project and had purchased a new SCADA under a contract requiring that the new system be Y2k compliant. However, the vendor's project schedule and the tests required for accepting the functionality of the system did not permit testing for Y2k compliance to be scheduled until July. This was past the June 30, 1999 readiness date, and, accordingly, a Level 2 rating was given.

VI i.   Composite Small Municipals

The results for the ten small municipals were all Level 3 ratings (Y2k Ready by June 30, 1999). There were a number of reasons that assisted this group in being Y2k Ready by the industry target. They are as follows:

- Very little digital automation in their systems.

- Very few devices with microprocessors.

- Rarely have SCADA systems.

- SCADA systems are not mission critical.

VI j.   Composite Larger Municipals

The results for the larger municipals were five with a rating of Level 3 (Y2k Ready by June 30, 1999) and five with a rating of Level 2 (Y2k Ready by December 31, 1999). The readiness dates for these latter five organizations are all projected in the third quarter of 1999. This cluster accounts for five out of six of the Level 2 ratings from the entire project.

A review of the information from the five organizations receiving Level 2 ratings shows that the reason for this rating is SCADA system remediation and testing that are pending vendor support. Of the ten larger municipals, five have SCADA systems. All five SCADA systems require additional work to become Y2k Ready after June 30, 1999. It appears that the major reason for this delay is the resource limitations of the SCADA vendors, causing them to extend their timetables for remediation of the SCADA systems into the third quarter of 1999.

As noted earlier, the smaller utilities usually started their Y2k programs for mission critical devices and systems later than the IOUs. This would serve to limit the timeframe available for remediation of the SCADA systems.

Clearly, the sample size here is small and it would be incorrect to conclude on the basis of this data that all municipals with SCADA systems are still awaiting vendor support for remediation and testing.

Figure 6-1 below depicts the twenty municipals in the sample. It shows the relative size of the municipal based on number of customers from smallest to largest (three dimensional cones on the back row). The chart indicates which municipals have digital equipment (12 out of 20), the municipals with mission critical SCADA systems (5 out of 20), and those SCADA systems which are Y2k Ready (0 out of 5). One can conclude that the larger the organization's size, the more likely the organization is to have a SCADA, and the more likely SCADA will be a mission critical system. The chart also shows the correlation between size and the presence of digital equipment. The larger in size the organization is, the more likely is the organization to have digital equipment, such as relays.
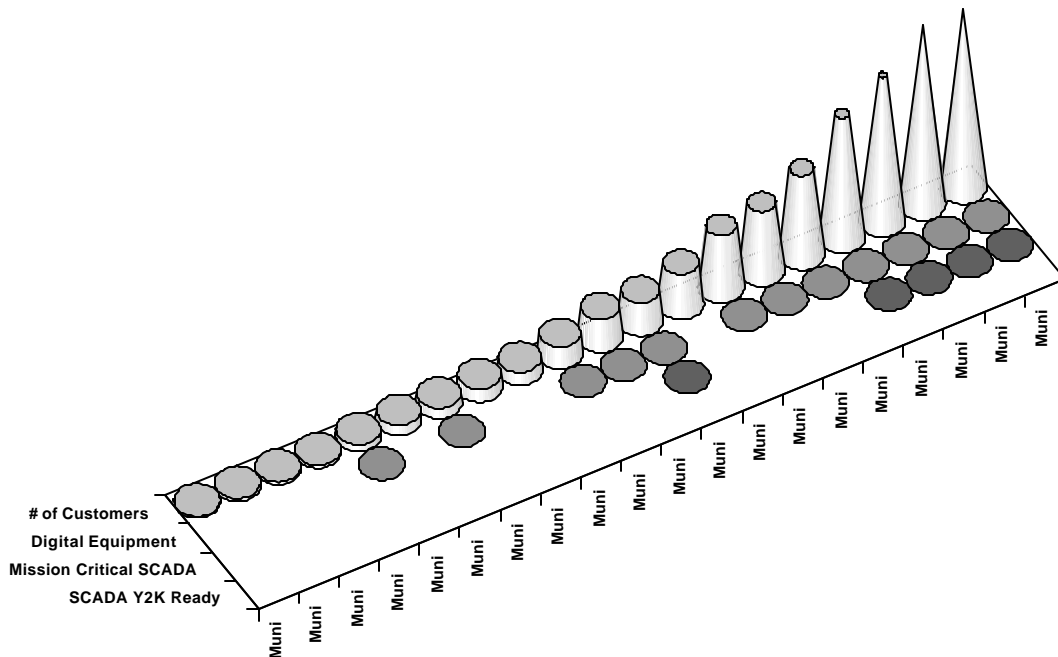
Figure 6.1 Municipal Use of Digital Automation Equipment

VI k.   Composite Distribution Cooperatives

All of the distribution cooperatives visited received Level 3 ratings (Y2k Ready by June 30, 1999). There are a number of reasons for all of the distribution cooperatives in the sample being Y2k Ready. The reasons are as noted below.

- Minimal automation in their systems.

- Digital automation they have is mostly digital relays, which are Y2k Ready.

- Few devices with microprocessors.

- Few SCADA systems.

A Year 2000 Disclosure
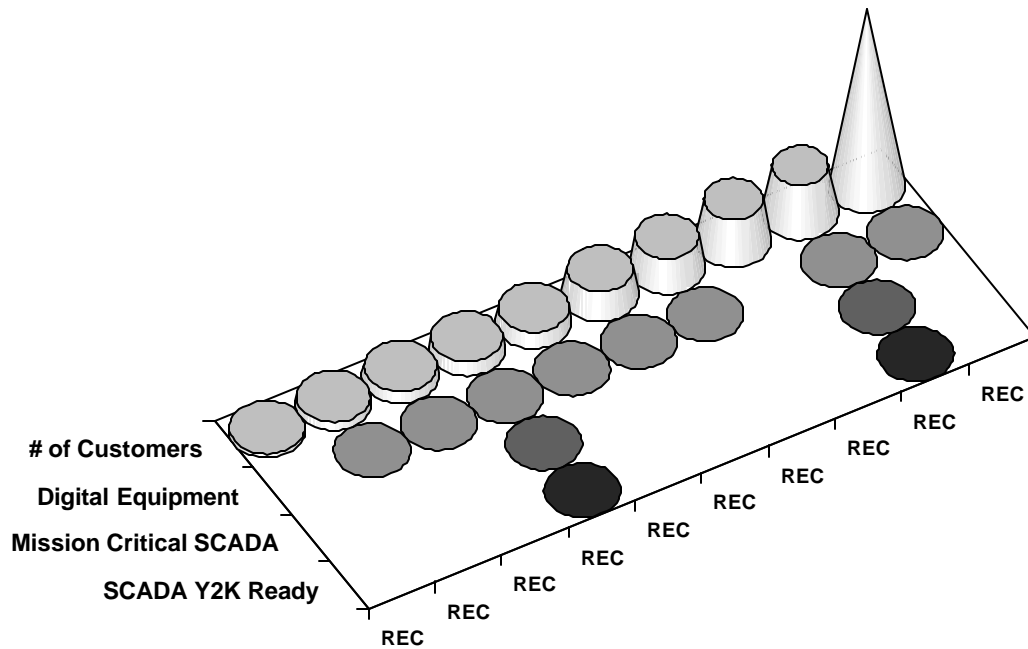
Figure 6.2 Cooperative Use of Digital Automation Equipment

Figure 6-2 above depicts the ten rural electric cooperatives in the sample in the same format as shown above for the municipals. The chart shows that the cooperatives are more likely to have digital equipment than a municipal with a similar number of customers. This is because the cooperatives typically have more substations due to the wider geographic area than a municipal of similar electrical size, and are more likely to employ digital relays in their operations. However, only two of the ten cooperatives visited have mission critical SCADA systems and both were Y2k Ready.

VI I.   Composite Investor Owned Utilities

All of the IOUs visited received Level 3 ratings (Y2k Ready by June 30, 1999). The IOUs were observed on average to have been working on the Y2k issue for a longer time than the other sectors and to have done the work necessary to remediate their Y2k mission critical devices and systems. In general, the Y2k strategies used by the IOUs were similar. Mainly this was a decentralized approach, where each department was responsible for the Y2k inventory, assessment, remediation and testing. Each department typically provided a representative on the Y2k project team. The Y2k project documentation usually resided within each department with the department's efforts reported to the Y2k program manager. The Y2k program manager would aggregate the information from the departments and report it to executive management within the utility.

# of Customers

Digital Equipment

Mission Critical SCADA

SCADA Y2K Ready

IOU

IOU

IOU

IOU

IOU

IPP
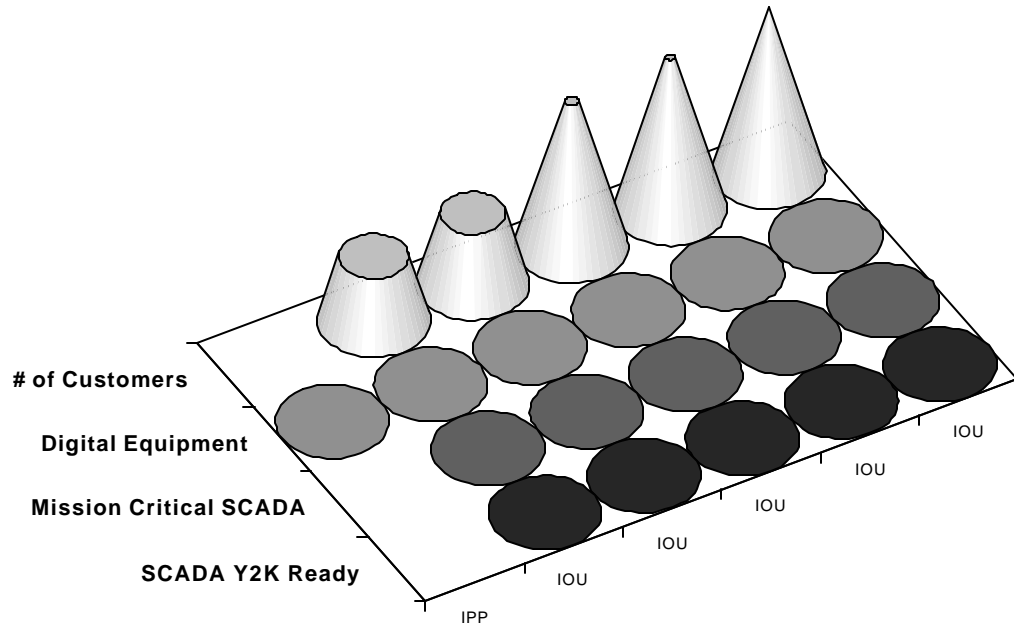
Figure 6.3 IOU-IPP Use of Digital Automation Equipment

Figure 6.3 above depicts the five IOUs and the IPP in the sample in the same format as the municipals and the cooperatives. The chart shows that all the IOUs in the sample have digital equipment and mission critical SCADA systems. The IOUs have substantially more customers and are highly automated compared to municipals and cooperatives. This result would be expected to be typical of IOUs, in that most would be expected to use some digital equipment and mission critical SCADA systems in their operations.

VI m.   Independent Power Producers

The chart above also shows the one IPP that was visited. While digitally automated, this IPP did not use a SCADA system in its operations since the operation was from a single location.

The single IPP in the sample was rated a Level 2 (Y2k Ready by December 31, 1999) because some final Y2k remediation and testing could not be completed until a third quarter maintenance outage, when certain digital chips will be changed in a Distributed Control System (DCS). Since this work is under the control of the IPP, no problem is expected in meeting the December 31, 1999 date for Y2k readiness. In all other aspects, the IPP had a very good Y2k program. It was well documented using written testing scenarios and cross-referenced to a Y2k database that was kept current.

VII.   Y2k Concerns of Project Participants

The organizations participating in the review were generally satisfied with the status of their projects and their readiness status. Most readily agreed with the reviewers' evaluations of their programs and were comfortable with the steps remaining. These review participants were past any stages of overriding concerns, general uneasiness, and confusion, and were taking the steps necessary to complete their programs and providing reasons for assuredness. The remaining concerns could be organized in three categories:

1. Internal program issues

2. Key supplier issues

3. Public response issues

Within their own utility organization, the participants shared concerns about how to readily bring their programs to completion, tie up loose ends, where to check for any missing elements, and the need for expertise to address boundary areas. The on-site review team saw these concerns as normal for any program manager bringing a project to closure and, where appropriate, offered observations to assist the Y2k program managers with closure issues. Common tools used to accomplish the last stage activities include: reliance on internal or external experts to sign off on given areas, use of the contingency plans to address external dependencies, and conducting "audits" of the program to check for gaps.

The participants' concerns with outside suppliers first rest with remediation contracts, especially vendors who have slipped on their original deadlines. Most often this meant completion in the third quarter of 1999 among SCADA and customer information system vendors.

The next level of concern was with external power generation and transmission services providers, especially among those utilities that have little or no generation or transmission capabilities themselves. Many of the smaller sample utilities are generation and transmission dependent and have a very high dependency on outside providers. In most cases this dependence is on a single supplier to provide these services. Many of the sample utilities stated they have very good working relationships with their power suppliers and were not concerned about their power suppliers being able to supply power to them.

The next level of concern was with external communications providers, principally local telephone service, although this included other wide area networking services as well. While all utilities visited have received some assurances from their local telephone provider, most will have a backup communications capability for the Y2k transition. Conversely, very few participants expressed any concerns about electric equipment suppliers since their inventories and arrangements with neighboring utilities have held up well through multiple storm events.

Without exception, all the participating organizations expressed concerns about the general public reaction approaching and during the key Y2k dates. For example, some of the municipal electric participants are concerned with large millennium celebrations taking place in their downtown areas that may easily quadruple the normal population at the center of their cities on December 31. Also all participants expressed concerns about unknown behavior that could occur on that date.

VIII.   Comparison of On-Site Reviews and Self-Reports to NERC, APPA, and NRECA

A direct, one-to-one comparison was made between the on-site review results and the self-reports made to NERC, APPA, and NRECA by each utility in the sample. To understand this comparison it is first necessary to understand the differences between the ratings produced by this review and those produced by the self-reporting process.

This review assigned each utility in the sample one of three ratings:

- Level 3: All mission critical devices and systems are Y2k Ready by June 30, 1999, and the organization should remain Y2k ready on December 31, 1999.

- Level 2: Not all mission critical devices and systems will be Y2k Ready by June 30, 1999, but all are likely to be Y2k ready by December 31, 1999.

- Level 1: Not all mission critical devices and systems will be Y2k ready by June 30, 1999, and not all may be Y2k Ready by December 31, 1999.

The NERC self-reporting process also produced three ratings:

- Y2k Ready - The utility reports that it has completed its Y2k readiness process for mission critical facilities by June 30, 1999.

- Y2k Ready with Limited Exceptions - The utility reports that it has completed its Y2k readiness process for mission critical facilities by June 30, 1999, with a few listed exceptions that are clearly-defined, limited in scope, scheduled to be completed by December 31, 1999, and not a risk to reliable operation into the Year 2000.

- Not Y2k Ready - The utility reports that it has not completed its Y2k readiness process for mission critical facilities by June 30, 1999.

There were some differences in the manner the levels assigned by the on-site review differed from those assigned in the NERC self-reporting process:

The on-site reviews did not allow any exceptions to the readiness of mission critical systems in assigning a rating. Although the NERC self-reporting process allowed a utility to report itself as "Y2k Ready with Limited Exceptions" if a limited number of mission-critical facilities were not Y2k Ready by June 30, the on-site review process would assign the utility a Level 2 rating in this case. This criterion required interpretation several times when a mission critical device or system had a workaround in place that caused the Y2k problem to become more of a cosmetic issue, such as a wrong date on a log, but did not affect the operational integrity of the system. Similar to the NERC criteria, the on-site review team considered the Y2k readiness of newly acquired but currently non-operational equipment after June 30, 1999 as part of the process of maintaining Y2k readiness but not part of the current rating.

With some notable exceptions, such as the Limited Exceptions criteria, the self-reporting process involved both self-assessment and self-interpretation of definitions and other criteria. The on-site reviews used a common set of criteria across all the reviews and did not consider the individual utility self-interpretations. Some utilities took a more strict interpretation of Y2k readiness, where even a wrong date on a log may be considered not Y2k ready.

VIII a. Municipals

APPA provided a limited summary of the responses of the sampled municipals. There were two sets of data, a March 1999 survey (indicated as covering only systems with more than 3000 meters), and a June 1999 survey that addressed only those systems that did not report being Y2k ready in earlier surveys.

The summary included data from 16 of the 20 municipals sampled in the review that revealed some issues and discrepancies in its contents.

- The March survey indicated that only utilities with more than 3000 meters were included, but six municipals with fewer than 3000 meters were included in the data. One municipal with over 15000 meters was not included, most likely they did not respond to the survey.

- Two municipals that reported readiness dates beyond June 30, 1999 in the March survey were not included in the June data.

- The summary provided only a limited subset of the survey data in tabular form without any of the narrative explanatory comments that may have been included with the surveys.

- Because the June survey only included municipals that had not reported 100% completion in the March survey, it was not possible for a municipal to report remaining work on issues that may have arisen since the March survey.

With a few exceptions, the readiness data correlated reasonably well with the findings of the on-site reviews. However, there were some significant issues requiring interpretation:

- Of the five municipals that were assessed at Level 2, two reported in March that they would not be Y2k ready by June 30. [Self-reported data and on-site assessment were in agreement.]

- The third municipal of the five receiving Level 2 ratings indicated 85% completion in the APPA data in March with no delayed readiness noted. This same utility, however, reported directly to NERC and indicated itself Y2k Ready with a Limited Exception. The exception was an unremediated SCADA pending scheduled vendor remediation after June 30. [The on-site review was consistent with the data reported to NERC.]

- The fourth municipal receiving a Level 2 rating was listed in the June APPA survey data as being 100% complete with no delayed readiness. At the final on-site review presentation, the general manager of the utility stated that he disagreed with the Level 2 rating because the utility's contingency plan covered the possible unavailability of the SCADA. This did not conform to the criteria for the on-site review, however. But in this case, the discrepancy between the self-reported data and the on-site review results were a specific item of judgment regarding the meaning of Y2k Ready. [Discrepancy between self-reported data and on-site assessment based on interpretation of Y2k Ready criteria.]

- The fifth municipal of the five receiving a Level 2 rating showed 100% completion in March with no delayed readiness noted, and was not listed in the June survey. The reason for the Level 2 rating by the on-site review team was an issue discovered during the on-site review (failure to test an aspect of the SCADA hardware). Many utilities expressed concern about the possibility of missing something in their Y2k readiness process, but this was the only instance during the 36 reviews in which a utility was found to have missed a test of a mission critical nature. [Discrepancy between self-reported data and on-site assessment due to incomplete testing.]

- In the APPA June 1999 data, one municipal reported it would not be Y2k ready until September 1999. The on-site review team provided a more positive Level 3 rating (Y2k Ready by June 30, 1999). The utility was waiting for an upgrade to non-critical software. A workaround had been identified for this software in the event of sustained delay. The on-site review team focused only on the mission-critical systems, and issues in the non-mission-critical systems were not assessed. Accordingly, there was no data collected during the on-site review that would identify the particular non-mission critical system. [Discrepancy with one municipal understating its readiness for mission critical electric systems.]

VIII b. Rural Electric Cooperatives

NRECA also provided a limited summary of the self-reported data for the ten cooperatives in the sample. All of the cooperatives had been determined by the review to be at Level 3 (Y2k Ready by June 30, 1999). However, two of the cooperatives self-reported that they would not be Y2k ready until after June 30. This may be due to the cooperatives including non-mission-critical systems in their self-assessments, or interpreting a cosmetic Y2k issue as not being Y2k Ready. One of the cooperatives reporting after June 30 readiness included billing systems and cash posting upgrades as these are viewed by the cooperative as mission critical.

VIII c. IOUs/IPP

NERC provided copies of the information self-reported by the utilities in the sample. The Y2k readiness data self-reported by the IOUs and the IPP was in agreement with the data determined by the on-site reviews. The data self-reported by the IPP (that was listed by NERC as Y2k Ready with Limited Exception) agreed with the Level 2 rating determined by the on-site review. The reason for the Level 2 rating was the same as the Limited Exception -- a power plant awaiting a scheduled outage for remediation of some equipment.

VIII d. Summary

The table below provides a summary of the comparison between the self-reported information and the on-site reviews. Of the 36 participating entities, comparison information was available for 32. Of the 32 entities compared, 27 provided self-reports that agreed with the on-site assessments. Of these 27, 4 were rated Level 2 (Y2k Ready after June 30, 1999 but before December 31, 1999). The remaining 23 were Y2k Ready by June 30, 1999, according to both the self-reported data and the on-site reviews.

Two municipalities were rated Level 2, but self-reported readiness by June 30, 1999. In the first case there was a clear disagreement between the self-assessment and the on-site review regarding interpretation of readiness criteria. In the second case a mission critical test had been missed in the process.

Three utilities (one municipal and two cooperatives) were rated Level 3 but self-reported that they would not be ready until after June 30. The reason for the difference may be the inclusion of non-mission critical system readiness as part of the self-reports, or cosmetic Y2k items. The on-site reviews determined that their mission critical electrical systems were Y2k Ready by June 30, 1999.

In summary, the comparison was showed consistency for 27 entities, two entities overstated their readiness, three understated their readiness, and comparison information was not available for four of the entities.

Comparison of Utility Readiness Self-Reporting and the On-Site Review Evaluations

Number of utilities in the sample	36
Number of utilities that information provided for comparison	32
Number of self-reports agreeing with on-site assessment (consistent self-reporting)	27
Number of utilities rated at Level 2 but self-reporting readiness by June 30 (self-reporting overstates readiness)	2
Number of utilities rated Level 3 but self-reporting not ready until after June 30 (self-reporting understates Y2k readiness)	3

IX.   Conclusions and Recommendations

The validity of the sample is supported by the fact that <u>all 36</u> of the utilities initially contacted, willingly participated in the evaluation, without exception. All supported the self-reporting process directed by NERC and all were willing to participate in the independent review process. Although the utilities were free to decline participation in the program of independent evaluation, none of them chose to do so. Rather they were eager to receive an outside review, to support a NERC directed national program, and to cooperate with their trade associations (NRECA and APPA).

In no cases did the review team find obstructions to the review process or unwillingness on a company or individual's part to participate and provide every detail about their programs. On the contrary, often times the on-site review team was swamped with large amounts of information and numbers of people with whom to speak. Each organization rearranged schedules, gave up staff time, or otherwise incurred costs to accommodate the review team on relatively limited notice and complied with the audit process. All indicated a sense of duty or of intrinsic gain from participating in the program that led to full cooperation.

Based on the results of the on-site reviews, is the industry's self-reported Y2k readiness status accurate and reliable?

The on-site review process results confirm the results stated by NERC in its August 3, 1999 report that mission critical electrical systems, those necessary to produce and deliver electricity and to provide essential customer services, will be ready for the Year 2000 transition. The on-site reviews indicate that readiness of mission critical electrical systems at the randomly selected organizations will be achieved in all cases by the end of the third quarter of 1999, regardless of the size, location or ownership type.

83% (30 of 36) of the sampled utilities were rated at the highest level, Level 3, *Company should meet NERC readiness date (June 30, 1999) and will be Y2k ready by December 31, 1999.* The remaining 6 (17%) were rated Level 2, *Company has some issues that cause concern for meeting NERC Y2k readiness date (June 30, 1999), but should be Y2k Ready by December 31, 1999. There is a need to monitor the company's progress.*

In all cases, the Y2k programs at the sample utilities were well under control and mission critical readiness has been or will be achieved by late September, often upon delivery of a key vendor software system. None of the utilities reviewed were rated at the lowest level, Level 1, *Company is not likely to meet the Y2k readiness date (June 30, 1999), and may not be Y2k ready by December 31, 1999.*

For 32 of the audited entities, the independent review team was able to compare the results of the on-site review with the information voluntarily reported to NERC or one of the trade associations (self-reported surveys were not available from the other four). Of the 32 entities compared, 27 provided self-reports that agreed with the on-site assessments. Of these 27, 23 were Y2k Ready by June 30, 1999, according to both the self-reported data and the on-site reviews. The remaining four were rated Y2k Ready after June 30, 1999 but expected to be completed in the third quarter of 1999.

There were differences between the self-reported data and the on-site reviews for the remaining five organizations, two over-stating their readiness and three understating their readiness. Two municipalities were determined by the on-site review team to be expected to achieve Y2k readiness after June 30, 1999, but

had reported themselves as Y2k Ready by June 30, 1999. In the first case there was a disagreement regarding interpretation of Y2k readiness criteria – the organization felt that a SCADA system that had not completed remediation and testing was Y2k Ready by virtue of a contingency plan. The on-site review team did not agree. In the second case, the on-site review team noted a critical test that had been missed by the organization.

Three audited utilities (one municipal and two cooperatives) were rated Y2k Ready by June 30, 1999, but self-reported that they would not be ready until after June 30. The reason for the differences was the inclusion of non-mission critical systems in the self-reported readiness assessment.

In summary, the comparisons showed consistency for 27 entities, two entities overstated their readiness, three understated their readiness, and comparison information was not available for four of the entities. A general conclusion from this limited set of comparisons is that, viewed from the aggregate, the industry's self-reported data appears reasonably accurate and balanced. Viewed on an individual organization level, there are subjective judgments regarding Y2k readiness – some judgments have been made over-conservatively and some under-conservatively. On a whole the judgments appear to balance.

Are smaller, local distribution systems more at risk?

Based on the results of the on-site visits, smaller, local distribution systems do not appear to be at any greater risk for Y2k than larger systems. This conclusion is based on the following observations:

- Most small distribution entities do not have digital devices or computer systems used in the delivery of electricity and do not own generation.

- Small, local distribution systems are aware of the Y2k issue and are doing a good job in executing their Y2k remediation and testing.

- Although small distribution systems may have started their Y2k efforts later than larger systems, the limited number of digital items in their inventories has allowed them to complete the efforts in a shorter amount of time.

In the process of the audits, the on-site review team observed the following additional findings:

- The entities that were delayed beyond the June 30, 1999 industry target had completed their programs with the exception of a SCADA system or customer information system that was pending an upgrade, testing, or certification by an external vendor.
- There is a great amount of diversity and local judgment applied in developing Y2k testing methods and criteria. Most of the testing concerns identified during the on-site visits were related to SCADA systems.
- There were no apparent geographic differences related to Y2k readiness.

Recommendation

The on-site review team recommends further audits be conducted to address the concern noted in this initial review for dependency on vendors to complete upgrades, testing, and certification of SCADA systems, energy management systems, customer information systems, and other computer systems. These additional audits will also increase the sample size of the review. These audits should focus on systems that are likely to have such computer systems, principally the larger and mid-sized organizations.

EXHIBIT I

On-Site Review Documents

1. On-Site Interview Process
2. On-Site Review Confirmation Letter
3. Y2k Readiness On-Site Checklist
4. Y2k Readiness On-Site Review Agenda
5. Y2k On-Site Interview Form
6. Y2k Electric System Readiness Assessment (On-Site Review Document)
7. DOE Y2k Readiness Evaluation
8. Telephone Call Form to Make Appointment for On-Site Visit
9. A Checklist for Utility Program Review (Y2k Readiness Strategies)
10. Profile of Organization Visited

On-Site Interview Process

1.0 Introduction

The intent of this document is to describe the Y2k on-site review process. Since, there will numerous teams doing the on-site reviews it is important to have a standard process that will lead to consistent review methods.

Having Y2k information from the organization prior to the actual on-site review will enable the review team to fill in a good portion of the on-site review document before the review.

2.0 Purpose

The purpose of the on-site reviews is to determine the actual Y2k status of randomly selected organizations in the electric industry. The U.S. Department of Energy (DOE) has requested a report that will verify the Y2k status information that has been voluntarily presented by electric industry organizations.

The on-site review process will be used to assess the written Y2k status information from the organization by applying on-site auditing procedures such as verifying the inventory, rerunning Y2k tests, and interviews with appropriate members of the organization.

3.0 Initial Contact

A list of candidate organizations has been randomly selected. The following steps should be followed to set up the review with the candidate organization:

    a. Make phone contact with the Y2k program manager at the candidate organization.

    b. Explain the purpose of the on-site review. It is important to stress that all information will be treated as confidential and that the intent of the DOE assessment is not to single out individual organizations.

    c. It is expected that with proper pre-visit preparation, the on-site review should take no more than 1-2 days.

    d. Set a date for the review, which allows time to receive and review information from the candidate organization. The following is a list of information that is beneficial to review prior to the meeting:
- Y2k program plan
- Y2k program plan status reports (last two)
- Y2k program team members and titles
- Person to whom the Y2k program manager reports
- Y2k budget information
- Inventory list of all mission critical functions and applications
- Y2k test plans
- Y2k test results
- Y2k independent reviews (last two)
- Y2k information supplied to state, federal and trade organizations
- Y2k web site location

    e. It is important that most, if not all, members of the organization's Y2k team be available during the on-site review.

    f. In addition, upper management of the organization should be available for the initial portion of the on-site review, and for the wrap up of the on-site review.

    g. A confirming letter should immediately be sent to the Y2k program manager confirming the on-site review date and time, who will attend

from both sides, and information to be supplied by the candidate organization for review prior to the review.

h. Use this conversation to fill out questions 1-4, 6 and 14.

4.0 Information Prior to the Interview

Three days prior to the review the following information packet will be sent by overnight express delivery to the Y2k program manager. This will allow ample time for them to prepare for the review meeting. The packet will contain meeting information and requests for on-site review documents.

-   Meeting Agenda
-   Variance reports/action plans resulting from remediation and testing
-   Tests to be rerun from Y2k test plans
-   Contingency plans for organization, including suppliers of goods and services
-   List of people to be interviewed (each interview should last 30-60 minutes)

5.0 On-Site Interview

The following steps outline the on-site review process.

a. Welcome and Introductions
b. Review meeting objectives
c. Review meeting agenda
d. Administrative details
e. Y2k program review using the on-site review document as the guide.
f. On-site reviewers make Y2k status evaluation of the organization.
g. Y2k status evaluation with supporting information is discussed with the organization's Y2k program manager.
h. Wrap up meeting to review the results with members of the Y2k program team and upper management.

6.0 On-Site Review Results

The results of the on-site reviews need to be forwarded to the program manager and included in the report to DOE. This includes the following:

a. On-site review summary
b. Y2k status evaluation
c.   Other information pertinent to theY2k evaluation

On-Site Review Confirmation Letter

[DATE]

[ADDRESS]

Subject: **U.S. Department of Energy Y2k On-Site Readiness Review**

Dear [SALUTATION],

Confirming our discussion and arrangements for your company's participation in the Department of Energy's Y2k On-site Readiness Review, I look forward to meeting with you and your Y2k program team on [DATE] at [TIME] AM at the facility located at [ADDRESS]. In addition to having persons who are directly involved with your company's Y2k efforts, it is important to have senior management, who are supporting your company's Y2k readiness efforts, present at the beginning of our meeting and at the wrap-up session.

I have attached an agenda for the meeting, but the actual course of the meeting may change based on our mutual findings. To further expedite the meeting and minimize the required time commitment by you and your team, please ensure that the program documentation that we discussed is delivered to us in advance, or made available at the meeting as previously agreed. The attached checklist indicates the specific Y2k program information that we need to review.

If there are any discrepancies in the above meeting arrangements or other questions or clarification required, please contact me at [PHONE] or [EMAIL].

Sincerely,

[NAME]
Y2k Review Team

Y2k Readiness On-Site Check List

The following information is requested to be available prior to or at the beginning of the meeting.

Information Requested   Received Date

1. Y2k Plan
2. Y2k Contingency Plan
3. Y2k Plan Updates
4. Y2k Inventory
5. Y2k Remediation Plan
6. Y2k Testing Plans/Results
7. Reports Made to Management/Other Agencies
8. Independent Audit Reports
9. Suppliers' Assurances for Y2k Services/Goods
10. Vendors' Assurances for Y2k Readiness
11. Other Pertinent Information

12. Rerun two of Y2k tests of remediated devices/systems

13. Interviews with persons responsible for electric service and customer service. These can be scheduled for the afternoon of the first day or the morning of the second day.

Y2k Readiness On-Site Review Agenda

1. Introduction

    A. Welcome and Introductions
    B. Review Program Objectives
    C. Review Agenda and Times
    D. Administrative Details

2. Meet with Y2k Program Team

    A. Company's Y2k Strategy
    B. Complete Y2k Program Information
    C. Discuss Program Status/Concerns
    D. On-site Review Team Checklist of Information Required

3. Y2k Program Review

    A. Review Y2k Plan
    B. Review Inventory, Remediation, Test Results
    C. Review Present Status
    D. Review Program Schedule
    E. Review Contingency Plans
    F. Review Prior Audits
    G. Rerun Tests
    H. Review Budget
    I. Review Suppliers'/Vendors' Assurances/Tests

4. Interviews

    A. Customer Service
    B. Electric Service

5. On-site Review Team Analysis

    A. Discuss Analysis with Y2k Program Manager
    B. Meet with Y2k Program Team

6. Meeting Wrap Up

    A. Discuss Results of Y2k Review
    B. Action Items

Y2k On-Site Interview Form

1. Organization Name: _____

2. Name: _____

3. Title: _____

4. Are you satisfied with the present status of the Y2k program?
   ☐ Yes _____ ☐ No _____
   If no, why not? _____

5. Do you believe the organization will be Y2k Ready before year-end? (Y2k Ready means a system or application has been determined to be suitable for continued use into the Year 2000.)
   ☐ Yes ☐ No Y2k Ready Date: _____

6. What are your concerns regarding the Y2k program?
   _____

7. Have you participated in the Y2k Testing?
   ☐ Yes _____ ☐ No _____

8. Are you comfortable with accepting vendors' assurances of Y2k readiness without testing?
   ☐ Yes _____ ☐ No _____ ☐ Somewhat _____

9. Have you participated in Y2k contingency planning?
   ☐ Yes _____ ☐ No _____

10. Have you reviewed and concurred with the Y2k contingency plans?
    ☐ Yes _____ ☐ No _____
    If no, why not? _____

11. Has Y2k contingency plan training been conducted?
    ☐ Yes _____ ☐ No _____ If no, when? _____

12. Have Y2k contingency plan drills been conducted?
    ☐ Yes _____ ☐ No _____ If no, when? _____

Are you confident that critical goods and services will be available during Y2k transition periods?
    ☐ Yes _____ ☐ No _____ ☐ Don't Know _____
    If no, why not? _____

On-site Review Document

1. Review Date _____ 2. Organization _____
Address? _____

2a. Organization Type? (Check the one that applies best)
☐Investor Owned   ☐FedAgcy   ☐State/Province   ☐Muni   ☐G&T Coop
☐Dist. Coop   ☐IPP   ☐ISO/Region   ☐Other

2b. Organization Functions? (Check all that apply)
☐CntrlArea   ☐Transmsn   ☐Generation   ☐Regional SecCoord
☐Distribution   ☐Other

   2c. Organization Size (Indicate the number of MW in each of the following categories for
   the utility covered by this report)?
   <u>System Peak Load</u>   <u>Non-nuclear GenCpcty</u>   <u>Nuclear GenCpcty</u>   <u># of Meters</u>

3. NERC Region? _____

4a. Person in charge of Y2k Program?   Name: _____
                                        Title: _____
                                        Phone: _____
                                        Fax #: _____
                                        Email: _____

4b. Names and titles of other Y2k program team members.
_____
_____

5. Review of written materials for Y2k readiness.
▪ Does the plan appear to be reasonable?   ☐ Yes   ☐ No   If no, why not? _____
▪ Are the Y2k readiness dates
  reasonable?   ☐ Yes   ☐ No   If no, why not? _____
▪ Has the plan been updated to reflect
  present status?   ☐ Yes   ☐ No   If no, why not? _____
▪ Is there a formal and sufficient plan
  review procedure?   ☐ Yes   ☐ No   If no, why not? _____
▪ Does the Y2k program budget seem
  sufficient?   ☐ Yes   ☐ No   If no, why not? _____

6a. Does the organization's Y2k program report directly to a company officer?
    Name & Title: _____

6b. Does the board of directors or governing body receive regular (at least quarterly) reports on
    the status of the Y2k program?   ☐Yes   ☐ No

7a. Identify the present overall status of Y2k program for mission critical functions and
    applications:

	Est. Completion Date	% Complete	If late, reasons:
Inventory	_____	_____	_____
Assessment	_____	_____	_____
Remediation/testing	_____	_____	_____

7b. What method was used to determine the Y2k mission critical inventory?

_____

7c. What rationale was used to determine ranking of inventory (critical, non-critical etc.)?

_____

8a. Date organization will be Y2k ready for all mission critical functions: _____

8b. If this is not the original date, what was the original date? _____

9. Have all suppliers of goods and services that are essential to mission critical operations been contacted to determine their ability to supply during critical Y2k periods? This includes telecommunications, fuel, water, transportation, material supplies, etc. ☐ Yes   ☐ No

10. Which suppliers, if any, will not give assurances there will be no disruption in goods and services?

_____

_____

11. For those suppliers that will not give assurances, is there a viable contingency plan?
   ☐ Yes _____   ☐ No _____

12a. Review status of Y2k operating contingency preparedness:

	% Complete	Date tested & drilled
▪ Y2k power supply plans	_____	_____
▪ Y2k restoration plans	_____	_____
▪ Y2k customer/supplier contacts	_____	_____
▪ Y2k special operating procedures & plans	_____	_____
▪ Y2k personnel staffing	_____	_____
▪ Y2k training	_____	_____

12b. Are the results of 12a available to others?   ☐ Yes   ☐ No

13a. Is there an independent review of your Y2k program?   ☐ Yes   ☐ No
    If yes, name of reviewing organization: _____

13b. Are these reviews submitted to board of directors/governing body?
    ☐ Yes _____   ☐ No _____

13c. How often are these reviews done?   _____

14a. Have all testable mission critical functions and applications in the inventory been tested?
    ☐ Yes _____   ☐ No _____

    If no, list those that have not been tested and status (attach organization's inventory list).
    Functions & Applications: Status:

    _____   _____

    _____   _____

    _____   _____

    _____   _____

14b. Has the Y2k readiness of mission critical functions and applications been accepted based on vendor and manufacturer assertions?   ☐ Yes   ☐ No

14c. Do the mission critical inventory and the test plans and test results match for each inventory item that needed remediation?   ☐ Yes   ☐ No

If no, what are the discrepancies?

_____
_____
_____
_____
_____
_____

14d. Has any inventory, remediation, or testing work been done by outside sources?
☐ Yes   Company Name & Contact: _____
☐ No

14e. What specific work was done by the outside sources? Be specific.

_____
_____
_____

15. Review of test plans/procedures/results that have been widely used to verify Y2k readiness for a sample of items in the inventory.

15a. Do test plans/procedures appear adequate and complete?   ☐ Yes   ☐ No

15b. Do the test results seem correct and complete?   ☐ Yes   ☐ No

If no, amplify why not. _____

15c. Rerun two of the tests.

Device/component/system name: _____
Test description: _____
Test results: _____
Comments: _____

Device/component/system name: _____
Test description: _____
Test results: _____
Comments: _____

16. Are there any exceptions to your stated Y2k completion dates? ☐ Yes   ☐ No
If so, what are they? Be specific: _____

_____
_____
_____

16a. What are the reasons for the exceptions? Be specific:

_____
_____

16b. What can be done to mitigate these exceptions?

_____
_____
_____
_____
_____

A Year 2000 Readiness Disclosure

17. Can outside resources help?   ☐Yes   ☐No
       How? _____
       _____
       _____
       _____
       _____

18. Have you made Y2k readiness information available to your customers?   ☐Yes   ☐No
       If no, will it be made available at a future date?   ☐Yes   ☐No   When? _____

19. Does the organization have a Y2k web site?   ☐Yes   ☐No
       If so, what is the URL? _____

20. What are the Y2k program manager's major concerns?
       _____
       _____
       _____
       _____
       _____

21. What else can be done to assist the organization's Y2k efforts?
       _____
       _____
       _____
       _____
       _____

22. Interviews were conducted with the following members of the organization. Interview forms to
       be filled out for each interview.

       Manager of electric systems: _____

       Manager of customer service: _____

Y2k Readiness Rating

Based on the information gathered from the On-site Review, the assessor is to make an evaluation of the organization's ability to meet the NERC Y2k readiness dates and criteria for all mission critical functions. The assessor will assign an overall level of risk based on the following:

☐ Level 1:   Company is not likely to meet the NERC Y2k readiness date (June 30, 1999), and may not be Y2k ready by December 31, 1999.

☐ Level 2:   Company has some issues that cause concern for meeting NERC Y2k readiness date (June 30, 1999), but should be Y2k ready by December 31, 1999. There is a need to continue to monitor the company's progress.

☐ Level 3:   Company should meet the NERC Y2k readiness target (June 30, 1999) and will be Y2k ready by December 31, 1999.

Company: _____

In the space below, the assessor is to list specific information that supports the conclusions. If additional space is needed, use additional pages.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

On-site Reviewer: _____   Date: _____
Y2k Program Mgr.: _____

Telephone Call Form to Make Appointment for On-Site Visit

Utility: _____

Contact: _____

Phone #: _____

Targeted Dates: _____

1. Description of on-site review program.

2. Ask if they are aware of the program.

3. Explain the program objectives.

4. All information is confidential.

5. Tell them that this is a service to them to validate their Y2k efforts.

6. Set the dates for visit.

7. Tell them what will be sent to them (agenda, confirm letter, checklist).

8. Call them back to confirm they received the information and whether they have questions. At this time tell them we want to rerun at least two of their tests.

A Checklist for Utility Program Review

Y2k Readiness Strategies

This checklist of strategies is intended for use by the Y2k On-Site Review Team to characterize a utility's strategies to achieve Y2k readiness. The checkmarks, or absence of them, are intended to simply record observations of the on-site review team and do not imply recommendations of judgments of correctness. Many strategies can lead to Y2k readiness and are often selected considering a utility's situation.

Awareness/Problem Definition

($\boxtimes$ = Major $\boxtimes$ = Minor)

☐ Primarily resides elsewhere, outside of utility.

☐ One of public perception and reaction.

☐ Technical with computers, software and embedded systems.

☐ Communications in regard to regulators and customers.

☐ A business issue that could affect our well being.

☐ Societal issue that threatens social infrastructure – our utility has a role to maintain it.

☐ Very difficult to define and keeps changing in completion as we approach the year 2000.

Comment:

Inventory

☐ Count all business and operating equipment and leave any filtering to the assessment stage.

☐ Count all *electronic* business and operating equipment.

☐ Count all *critical* business and operating equipment whether electronic or not.

☐ Count all *electronic*, *microprocessor based*, and *calendar/clock* based equipment.

☐ Count all software wherever it resides.

☐ Count equipment and software whether it is *owned or not* if part of providing electric service or communications.

☐ Count only *utility owned* equipment and software equipment.

Comment:

Program Organization

☐ Centralized   ☐ Top Management

☐ Executive Sponsor

☐ Y2k Coordinator reports to CEO or VP

☐ Y2k Team centrally located and charged

☐ Reporting through central Y2k office

☐ Outside assistance reports centrally

☐ Decentralized   ☐ Minimal central coordination, departmental or functional area driven.

☐ Primary readiness responsibility rests with departments.

☐ Y2k Team consists of departmental managers or staff.

☐ Reporting originates and is approved at departmental level.

☐ Outside assistance reports to department.

☐ Y2k tasks of inventory assessment, testing, etc. rests with department.

☐ Mixed (some of each of the above, see checkmarks).

Comment:

Assessment (overall or by area)

☐ Screen and prioritize inventory items by:

     ☐ Service criticality

     ☐ Reliance on clock calendar

     ☐ Interconnectedness/part of larger system

☐ Obtain compliance information:

     ☐ Letter campaign

     ☐ Vendor websites

     ☐ Industry databases

     ☐ Other utilities/joint efforts

     ☐ Self-checking and testing

☐ Determine problem severity:

    ☐ Service criticality

    ☐ Estimated remediation cost

    ☐ Lead time/resource constraints

    ☐ Interconnectedness of system

    ☐ Ownership/responsibility problems

☐ Use expert judgment:

    ☐ Internal by area and expertise

    ☐ External: ☐ Overall

                        ☐ Specialists:

☐ Product assessment deliverables:

    ☐ Analysis report

    ☐ Areas of attention directives

    ☐ Product or services orders

    ☐ Grading/prioritization of inventory list

Comment:

Remediation (overall or by area of function)

☐ Doubt need, test specific performance.

    Recognize minor issues but test to assure they do not cause significant problems.

☐ Develop work-around.

    Avoid problem areas with change in procedure.

☐ Patch and fix.

    Do just what is needed to get through.

☐ Upgrade.

    Move to latest, higher version.

☐ Replace.

    Use as reason to purchase new and gain additional benefits.

☐ Redesign system and work processes.

Comment:

Testing (overall or by area)

Testing Targets

☐ Test all equipment and software.

☐ Test to substantiate vendor statements.

☐ Test those items with incomplete compliance information.

☐ Test representative field sample of devices.

☐ Test mission critical systems.

☐ Test as a means of assessment.

☐ Test after remediation as a means of verification and assurance.

Testing Methodology (by area or system)

Test for key dates:

☐ Major Dates ☐ Others ☐ Comprehensive/All

    ☐ September 9, 1999 -   ☐ December 31, 2000 -

       September 10, 1999   January 1, 2001

    ☐ December 31, 1999 -   ☐ February 28, 2001 -

       January 1, 2000   March 1, 2001

    ☐ February 28, 2000 -   ☐ December 31, 2027 -

       February 29, 2000   January 1, 2028

    ☐ February 29, 2000

       March 1, 2000

Transition approaches:

    ☐ Roll over Power on

    ☐ Roll over Power off/reset

Observation methods:

    ☐ Device/software display

    ☐ Transfer of date to other device

    ☐ Device/software key function during test

Test location:

    ☐ Lab bench or office at utility

    ☐ In the field

    ☐ Office/field/communications system

Test reliance:

    ☐ Utility itself

    ☐ Service/outside assistance

    ☐ Vendor personnel: ☐ On-site ☐ Vendor site

    ☐ Other tests by others of similar systems

☐ Test reporting:

    ☐ Lab notes

    ☐ Summary document

    ☐ Documented methodology

    ☐ Test report

    ☐ Certification credentials

    ☐ Outside review/audit

Comment:

Contingency Planning

☐ Self-contained, "lights out" contingency

☐ Telecommunications contingencies

☐ Emergency preparedness coordination

☐ Critical load/public safety contingencies

☐ Business continuation contingencies

☐ Inclusion of drills and staff training

☐ Targeted systems contingencies

☐ Terrorist act contingencies

☐ Islanding/generation self-reliance contingencies

☐ Loss of supply (non-power) contingencies

☐ Public communications/customer relations contingencies

☐ Risk management contingencies

☐ Alternative "chain of command" contingencies

☐ Approval, acceptance, adoption

    ☐ Utility Staff

    ☐ Utility Management

    ☐ Utility Board

    ☐ Governmental/Regulatory

    ☐ Regional Group

☐ Actual drill performance and stage training

☐ Reporting

    ☐ Internal

        ☐ Knowledge and discussions only – no report

        ☐ For special group

        ☐ For staff

        ☐ For management/board

            ☐ Knowledge and discussions only

    ☐ External

        ☐ Customers/public

        ☐ Regulatory

        ☐ Regional coordination

        ☐ Special effects

Comment: _____

_____

_____

Y2k Outreach Services

☐ Low Profile

    ☐ Kept to utility only

    ☐ Involves subsidiaries

☐ Medium Profile

    ☐ Offered to key customers

    ☐ Offered to critical loads/public safety

    ☐ Information/services to general customers

    ☐ Assists other utilities and organizations

☐ High Profile

    ☐ Extensive use of media

    ☐ Public program of assistance extending over one year

    ☐ Seen as part of company business strategy

Comment: _____

_____

_____

Overall Elements

☐ Strategy, attitude, and approach.

☐ Budgeting and cost management.

☐ Customer communications.

☐ Legal and risk management.

☐ Industry partnering and competition.

☐ Legislative and regulatory.

☐ Supplier management.

☐ Staff awareness and training.

Comment:

Risk Management and Due Diligence

☐ Risk analysis and management component of program

    ☐ Insurance review

    ☐ Risk management action steps

☐ Use of risk management tools

    ☐ Team accountability

    ☐ Documentation

        ☐ Chronology/diary of events

        ☐ Contacts/correspondence/notices

        ☐ Completed planning report

        ☐ Completed contingency plan

        ☐ Key supplier/customer files

    ☐ Alignment with industry activities (filings, drills, etc.)

    ☐ Outside review

Comment:

Summary Profile of Organization Reviewed

1. Year 2000 Readiness
Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the on-site review, the assessors evaluated the company's ability to meet the NERC Y2k readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

☐ Level 1:   Company is not likely to meet the NERC Y2k readiness date (June 30, 1999), and may not be Y2k ready by December 31, 1999.

☐ Level 2:   Company has some issues that cause concern for meeting NERC Y2k readiness date (June 30, 1999), but should be Y2k ready by December 31, 1999. There is a need to continue to monitor the company's progress.

☐ Level 3:   Company should meet NERC Y2k readiness date (June 30, 1999) and will be Y2k ready by December 31, 1999.

The assessors reached this conclusion based on the following insights:

    i)
    ii)
    iii)
    iv)
    v)
    vi)
    vii)
    viii)

2. Profile of Utility
2.1 General statistical information

Utility Type:
Annual Gross Revenue (Year):
Control Area
System peak Load:
Load Characteristics:
     No. of Customers
     No. of Residential Customers
     No. of Commercial Customers
     No. of Industrial Customers
     No. of Other Customers

Number of Substations: _____

Generation

       Owned and Operated - non nuclear _____

       Owned and Operated - nuclear _____

       Purchased Power & Sources _____

System Characteristics _____

Overhead Transmission _____

       KV/Circuit Miles _____

Underground Transmission _____

       KV/Circuit Miles _____

Overhead Distribution _____

       KV/Circuit Miles _____

Underground Distribution _____

       KV/Circuit Miles _____

Load Characteristics:

       Expected Load at Transition from
       1999 into year 2000 _____

       Percent Selfgeneration _____

Source: Annual Report

       Electrical World Directory

       Web Page – *If available*

       Other - *specify* _____

URL to Web Page: _____

2.2 Local Y2k environment

(Include relevant information about the utility such as what fuel base is used for generation, black start capability, types of loads served by the utility, critical loads, dependence on power from others, degree of integration with other utilities etc.)

_____

_____

_____

_____

_____

_____

_____

_____

3. Year 2000 Readiness History

3.1 Start of Y2k preparation

(When did the preparation begin and at whose initiative. What was the budget and personnel allocated to achieve Y2k readiness, key people in Y2k program with reporting – organization chart if available to be attached)

_____

_____

_____

_____

_____

(Role of outside consultants and auditors)

_____

_____

_____

_____

_____

_____

_____

3.2 Assessment strategy

(Inventory process or the method used to identify inventory. Identification of all possible components – all digital or only the critical digital systems. Definition of critical (i.e., business critical or mission critical - keep the lights on)

_____

_____

_____

_____

_____

(Assessment strategy/testing- relied on vendor information, sample testing, simple testing – reduced date set etc.)

_____

_____

_____

_____

_____

_____

_____

(Critical supplier approach - method used to identify critical suppliers; e.g. purchase records etc. (power suppliers, fuel suppliers, water suppliers, phone service, and other vendor strategy)

_____

_____

_____

_____

_____

3.3 Test strategy and procedures

(Risk based priority test strategy - highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

_____

_____

_____

_____

_____

_____

_____

(Testing procedures - compliance assessment testing: test date and date transitions testing; application tests; validation tests (of remediation work); differentiation between large and complex systems and small, stand-alone systems with embedded chips; integrated tests or unit tests; test audits)

_____

_____

_____

_____

3.4 Remediation strategy
(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

_____

_____

_____

_____

_____

_____

_____

3.5 Customer information and survey responses
(Active customer information program to encourage rational, informed behavior by customers at the transition from year 1999 to 2000; response to requests for information on Y2k readiness from others such as local phone company, hospitals etc.)

_____

_____

_____

_____

_____

_____

_____

3.6 Quality control to ensure that Y2k readiness is achieved and maintained
(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

_____

_____

_____

_____

_____

_____

_____

3.7   Contingency plans
(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

_____

_____

_____

_____

_____

_____

_____

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2k readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

_____

_____

_____

_____

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

_____

_____

_____

_____

_____

_____

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

_____

_____

_____

_____

_____

_____

_____

_____

4.4 Retest of selected equipment/systems
(Selection process – assessors allowed to select or utility selection, repeat of test generated, same results as when utility (or tester) did the test last time etc.)

_____

_____

_____

_____

_____

_____

_____

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*
(Impressions from interview; concerns and or convictions and reasons for these)

Name: _____   Title: _____

_____

_____

_____

_____

_____

5.2 Interview #2 –
Name: _____   Title: _____

_____

_____

_____

_____

_____

_____

5.3 Key Concerns of Utility Managers
(Include anything that may be helpful in understanding the reasons for the concern)

_____

_____

_____

6 Key People Participating in the Assessment

6.1 Utility personnel

6.2 On-site reviewers

EXHIBIT II

Y2k Readiness Strategies Checklist Database

Y2k Readiness Strategies Checklist Database

TOTALS

Awareness/Problem Definition (Figure 4.2)

Primarily resides elsewhere, oustide of utility	6
One of public perception and reaction	5
Technical with computers, software and embedded systems	34
Communications in regard to regulators, customers and those possibly bringing legal changes	4
A business issue that could affect our well being	13
Societal that threatens social fabric - our utility has a role to maintain it	5
Very difficult to define and keeps changing in completion as we approach the Year 2000	1

Inventory (Figure 5.1)

Count all business and operating equipment and leave any filtering to the assessment stage	9
Count all *electronic* business and operating equipment	9
Count all *critical* business and operating equipment whether electronic or not	5
Count all *electronic, microprocessor based* and *calendar/clock* based equipment	20
Count all software wherever it resides	5
Count equipment and software whether it is *owned or not* if part of providing electric service or communications	7
Count only *utility owned* equipment and software equipment and software	6

Project Organization (Figure 4.1)

CENTRALIZED	34
Top Management	14
Executive Sponsor	6
Y2K Coordinator reports to CEO or VP	21
Y2K Team centrally located and charged	6
Reporting through central Y2K office	7
Outside assistance reports centrally	5
DECENTRALIZED	13
Minimal central coordination, departmental or functional area driven	1
Primary readiness responsibility rests with departments	10
Y2K Team consists of departmental managers or staff	9
Reporting originates and is approved at departmental level	3
Outside assistance reports to department	1
Y2K tasks of inventory assessment, testing, etc. rests with department	7
MIXED (CONTAINS SOME OF BOTH)	12

Assessment (Figure 5.2)

Inventory items screened and prioritized by service criticality	24
Inventory items screened and prioritized by reliance on clock calendar	25
Inventory items screened and prioritized by interconnectedness/part of larger system	4
Compliance information obtained by letter campaign	30
Compliance information obtained by vendor websites	21
Compliance information obtained by industry databases	9
Compliance information obtained by other utilities/joint efforts	7
Compliance information obtained by self-checking and testing	15

Remediation (Figure 5.3)

Doubt need, test specific perfomance	8
Develop workaround	16
Patch and fix	13
Upgrade	22
Replace	19
Redesign system and work processes	0

Testing Targets (Figure 5.4)

Test all equipment and software	0
Test to substantiate vendor statements	4
Test those items with incomplete compliance information	4
Test representative field sample of devices	4
Test mission critical systems	13
Test as a means of assessment	6
Test after remediation as a means of verification and assurance	6

Testing Methodology (Figure 5.5)

MAJOR DATES	17
9/9/99-9/10/99	9
12/31/99-1/1/00	18
2/28/00-2/29/00	11
2/29/00-3/1/00	8
OTHER DATES	5

Y2k Readiness Strategies Checklist Database

Testing (Figure 5.6)

Transition Approach: Rollover - power on	17
Transition Approach: Rollover - power off/reset	7
Observe device/software display	14
Observe transfer of date to other device	6
Observe device/software key function during testing	3
Test at lab bench/office	9
Test in field	13
Test office/field/communications system	4
Utility personnel did testing	17
Service/outside assistance for testing	5
Vendor personnel did testing	5
Relied on third party testing	3
Test Reporting: Lab notes	4
Test Reporting: Summary document	8
Test Reporting: Documented methodology	5
Test Reporting: Test report	2
Test Reporting: Certification credentials	0
Test Reporting: Outside review/audit	0

Contingency Planning (Figure 5.7)

Self contained, "lights out" contingency	16
Telecommunications contingencies	22
Emergency preparedness coordination	17
Critical load/public safety contingencies	18
Business continuation contingencies	10
Inclusion of drills of staff training	16
Targeted systems contingencies	9
Terrorist act contingencies	3
Islanding/generation self-reliance contingencies	9
Loss of supply (non-power) contingencies	22
Public communications/customer relations contingencies	15
Risk contingencies management	4
Alternative "chain of command" contingencies	7
Approval, acceptance, adoption by utility staff	3
Approval, acceptance, adoption by utility management	15
Approval, acceptance, adoption by utility board	5
Approval, acceptance, adoption by governmental/regulatory	2
Approval, acceptance, adoption by regional group	0
Actual drill performance and stage training	13

Reporting (Figure 5.8)

INTERNAL	27
Knowledge and discussions only - no report	12
For special group	5
For staff	7
For management board	24
EXTERNAL	18
Customer/public	12
Regulatory	12
Regional Coordination	8
Special effects	0

Risk Management & Due Diligence (Figure 5.9)

Risk analysis and management component of program: insurance review	5
Risk analysis and management component of program: risk management action steps	3
Use of risk management tools: team accountability	8
Use of risk management tools: documentation	20
Use of risk management tools: alignment with industry activities (filings, drills etc.)	16
Use of risk management tools: outside review	3

EXHIBIT III

NERC Letter to Industry Regarding On-site Reviews

NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

Princeton Forrestal Village, 116-390 Village Boulevard, Princeton, New Jersey 08540-5731

May 20, 1999

To: Year 2000 Readiness Review Participants

Subject: U. S. Department of Energy Sponsored Independent Reviews of Year 2000 Programs

With sponsorship of the U.S. Department of Energy (DOE), the North American Electric Reliability Council (NERC) is conducting an independent review of Y2k programs at a random sample of electric power organizations in North America. The goal of this effort is to validate the self-reporting process that NERC has established to provide periodic reports to DOE on the Y2k status of the industry. This review process is not concerned with the readiness of any individual organization, but is gauging the overall readiness of the industry through a randomly selected sample.

A review team has been established and is in the process of scheduling and conducting on-site reviews. The review team consists of qualified independent contractors hired for this purpose. The review team uses an outline developed from the NERC Y2k Readiness Assessment Report (the EXCEL spreadsheet is available on the NERC Y2k web site at http//www.nerc.com/y2k). The review process focuses on verifying information that would typically be reported to NERC or one of its trade association partners[1].

Candidate organizations have been selected randomly from the over 3000 organizations in North America that produce, transmit or deliver electricity. By participating in this review, each selected organization is able to represent the status of Y2k readiness of that particular sector of the industry. The sample profile has been carefully designed to assure representation of ownership types, size, geographic location and other factors.

A summary report of the on-site reviews will be provided to DOE and the public in late July 1999. No utility organizations participating in the review will be identified by NERC or anyone affiliated with the review process. The results will be identified as Utility A, B, C, etc. Each participating utility organization will be provided an opportunity to review the report to assure that sensitive information has been removed.

It is very important that each organization that is requested to participate does so. Any refusals to participate will be recorded as part of the process. Refusals to participate will reflect

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[1] NERC is being assisted by the American Public Power Association, the Canadian Electricity Association, the Edison Electric Institute, and the National Rural Electric Cooperative Association.

independent assessment of the program. This service is provided without charge to the randomly selected organizations.

I request that each organization that is contacted cooperate fully with the Y2k readiness review team. In exchange, I will assure the confidentiality of the identity of each organization participating in the review process.

If you have any further questions about the review process, please contact Terry Devaney at 408-532-7185 or tdevaney@worldnet.att.net.

Yours truly,

Michehl R. Gent
President

Cc: Review Team Members, H. Gruenspecht (DOE), M. Hyland (APPA), R. Greenhalgh (NRECA), F. Bradley (CEA), NERC Y2k Regional Coordinators, NERC Y2k Program Managers List

EXHIBIT IV

Detailed Results for Each Organization Reviewed

<u>Organization Visited: Utility A</u>

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

☒Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

- Utility A is a transmission *and* substation services dependent utility. This distribution system has no microprocessor-based monitoring and control equipment. All metering is electro-mechanical with no dependency on electronic reading equipment. Communications are based on traditional technologies: telephone, mobile radio and pagers. The town's small size of 270 customers and one square mile of service territory precludes the need for redundant communications or special Y2K contingency planning. The three principle operating personnel are extremely familiar with the system, its lack of microprocessor controls and its capability to respond to events including Y2K possible problems. Utility A is well prepared for Year 2000 due to the lack of sophisticated equipment and great familiarity of the system to its operating personnel.

Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue (Year):	
Control Area	
System peak Load:	
Load Characteristics:	
No. of Customers	
No. of Residential Customers	
No. of Commercial Customers	
No. of Industrial Customers	
No. of Other Customers	
Number of Substations:	None

Organization Functions:
    ☐CntrlArea   ☐Transmsn ☐Generation   ☐Regional SecCoord
    ☒Distribution   ☐Other

- No substations, only one distribution voltage.

Organization Size (Indicate the number of MW in each of the following categories for the utility covered by this report)?

System Peak Load	Non-nuclear GenCpcty	Nuclear GenCpcty	# of Meters
< 1 MW	None	None	270
			170 Transformers

- Municipal utility started in 1940's after originally owned by an individual.

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility A runs a strictly "wires" based distribution utility with no power generation, transmission or voltage transformations other than for customer service drops to homes and small commercial enterprises. The system is operated without any type of monitoring and control.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Over a year ago, Utility A declared "readiness" since they had no reason to doubt their preparedness due to the simplicity of their system. At the same time, their newly acquired billing and accounting system was deemed compliant by the software vendor and computer manufacturer.

(Role of outside consultants, auditors and their roles)

- None

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Utility A relied on the intimate knowledge their Operations personnel have of the electric distribution system to form their assessment. Quickly they concluded a lack of digital systems and nothing on *their* system to prevent keeping the lights on.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Utility A's new billing and accounting system was the only system worth questioning. This system was purchased with the understanding of Y2K compatibility. Utility A has received a letter from this system provider assuring them that this is the case.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Utility A has a close relationship with its supplier of power, transmission and substation services. Through this relationship, Utility A has received a number of assurances of their provider's ability to perform over the millennium.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility A has relied upon their suppliers to perform the testing they deem necessary.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- None; supplied by others

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Utility A deemed no remediation was necessary.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility A handles all customer contacts on nearly a first name basis with its 270 customers. Y2K concerns have rarely surfaced and have been addressed in daily discourse with customers.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility A due to the simplicity of their situation has not seen the need for quality control measures.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility A relies on its relation with its power supplier and its mutual aid agreements with neighboring utilities for its contingency plans. It also relies on its small size (270 customers and one square mile of service territory) to respond readily to any event.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility A is Y2K ready and always has been, due to the lack of clock/calendar based mission critical equipment.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Utility A has statements from their software and power suppliers. These serve as the extent of their Y2K documentation.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Utility A has nothing to test outside of their billing and accounting system. The provider tested this system and Utility A declared it non-mission critical for electric and customer service operations.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- None necessary

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Town Clerk
- We're a small, simple utility with no internal Y2K concerns, and we have a customer base with very few concerns as well.

5.2 Interview #2 –

Name: Title: Town Superintendent
- We run a simple, non-digital based electric distribution system. We're Y2K ready by default – there's nothing prone to Y2K problems to get ready. If our power supplier comes through, we have no concerns.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- See interviews above.

6. List of Key People Participating in the Assessment

6.1 Utility people

- Town Superintendent
- Town Clerk

Organization Visited: Utility B

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

☒Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

- The Utility B is a transmission *and* substation services dependent utility (served by an Energy Provider). This distribution system has no microprocessor-based monitoring and control equipment. All metering is electro-mechanical with no dependency on electronic reading equipment. Communications are based on traditional technologies: telephone, mobile radio and pagers. The town's small size of 510 customers precludes the need for redundant communications or special Y2K contingency planning. The principle operating personnel are extremely familiar with the system, its lack of microprocessor controls and its capability to respond to events including Y2K possible problems. Utility B is well prepared for Year 2000 due to the lack of sophisticated equipment and great familiarity of the system to its operating personnel.

Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue (Year):	$428,000
Control Area	
System peak Load:	1.57 MW
Load Characteristics:	
No. of Customers	504
No. of Residential Customers	438
No. of Commercial Customers	54
No. of Industrial Customers	
No. of Other Customers	12
Number of Substations:	None

Organization Functions:
   ☐CntrlArea   ☐Transmsn   ☐Generation   ☐Regional SecCoord
   ☒Distribution   ☐Other

One metering point, Alliant.

Organization Size (Indicate the number of MW in each of the following categories for the utility covered by this report)?

System Peak Load	Non-nuclear GenCpcty	Nuclear GenCpcty	# of Meters
1.57 MW	None	None	510

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility B runs a strictly "wires" based distribution utility with no power generation, transmission or voltage transformations other than for customer service drops to homes and small commercial enterprises. The system is operated without any type of monitoring and control.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Over a year ago, Utility B declared "readiness" since they had no reason to doubt their preparedness due to the simplicity of their system. At the same time, their newly acquired billing and accounting system was deemed compliant by the software vendor and computer manufacturer.

(Role of outside consultants, auditors and their roles)

None

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Utility B relied on the intimate knowledge their Operations personnel have of the electric distribution system to form their assessment. Quickly they concluded a lack of digital systems and nothing on *their* system to prevent keeping the lights on.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Utility B's new billing and accounting system was the only system worth questioning. This system was purchased with the understanding of Y2K compatibility. Utility B has received a letter from this system provider assuring them that this is the case.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Utility B has a close relationship with its supplier of power, transmission and substation services. Through this relationship, Utility B has received a number of assurances of their supplier's ability to perform over the millennium, and reviewed the supplier's Y2K contingency plan.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility B has relied upon their suppliers and the supplier to perform the testing they deem necessary.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- None; supplied by others

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Utility B deemed no remediation was necessary

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility B handles all customer contacts on nearly a first name basis with its 510 customers. Y2K concerns have rarely surfaced and have been addressed in daily discourse with customers.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility B, due to the simplicity of their situation, has not seen the need for quality control measures.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility B relies on its relation with its power supplier for its contingency plans. It also relies on its small size (510 customers) to respond readily to any event.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility B is Y2K ready and always has been, due to the lack of clock/calendar based mission critical equipment.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Utility B has statements from their software and power suppliers. These serve as the extent of their Y2K documentation.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Utility B has nothing to test outside of their billing and accounting system. The provider tested this system and Utility B declared it non-mission critical for electric and customer service operations.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- None necessary

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title:

5.2 Interview #2 –
Name: Title:

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

6. List of Key People Participating in the Assessment

6.1 Utility people
- Assistant Public Works Director

<u>Organization Visited: Utility C</u>

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

☒ Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

    i)   Utility C has sufficient generation for peak loads with alternate fuel sources available.

    ii)   Utility C's generation has black start capability.

    iii)   Utility C staff has a thorough working knowledge of their electric system.

    iv)   Utility C has inventoried all equipment critical to electric system, and no processor-controlled devices were found.

    v)   Utility C is in the process of remediating equipment non-critical to generation and distribution of electricity.

Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue (Year):	$414 K
Control Area	
System peak Load:	2272 KW
Load Characteristics:	
No. of Customers	505 (1998)
No. of Residential Customers	419
No. of Commercial Customers	85
No. of Industrial Customers	0
No. of Other Customers	1
Number of Substations:	1

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility C has sufficient generation to satisfy their system's peak load which is primarily residential. Utility C has black start capability, and their black start plan includes prioritization of critical load pick up. Utility C's generation uses diesel fuel and can operate for one week with one tank of fuel. Utility C has located alternative sources for diesel fuel if needed.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The Utility Superintendent assessed Y2K readiness state when Y2K first received media attention.

(Role of outside consultants, auditors and their roles)

- No outside consultants or auditors were used.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Critical electrical system inventory was taken and assessed using a walk-through of Utility C's plant and substation.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Utility C assessed all critical electric system inventory as non-processor controlled.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Utility C identified critical suppliers through assessment of external needs.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility C did not identify any critical electric system devices that were Y2K testable.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Utility C did not require remediation of any critical electric system devices for Y2K readiness.
- Utility C expects full Y2K readiness with their billing system by the Year 2000.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility C has maintained a low profile regarding Y2K readiness. Utility C has no large loads that could adversely affect their system by behaving unexpectedly during Y2K transition periods.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility C does not anticipate the purchase of any date sensitive electronic equipment for their electric system prior to the Year 2000.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility C can generate sufficient energy to satisfy their system's peak load. Utility C plans to generate for their system in the event of loss of power from their supplier.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility C's electric system was fully Y2K ready at the time of the assessment (7/28/99). The simplicity of their system and the Electric Superintendent's knowledge of their system allowed them to spend minimal time and effort to ascertain Y2K readiness.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Utility C chose not to generate any Y2K documents to conserve available resources.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Utility C did not have any Y2K testable electric system equipment and therefore had not done any testing or created any test records.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- There was no equipment at Utility C to retest.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Utility Superintendent
- Interviewee is confident that Utility C's electric system is Y2K ready. Interviewee's biggest Y2K concern is loss of power from Utility C's power suppliers.

5.2 Interview #2 –

Name: Title: City Clerk Treasurer
- Interviewee is confident that Utility C's electric system is Y2K ready. Interviewee is waiting for Accounts Payable/General Ledger software to make the office fully Y2K ready.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- Utility C's only concern regarding Y2K is loss of power from their supplier. Utility C can generate their own load, but at a higher cost per kilowatt hour.

6. List of Key People Participating in the Assessment

6.1 Utility people

- Utility Superintendent
- City Clerk Treasurer

Organization Visited: Utility D

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Department has no mission critical Y2K equipment in its system.
ii)   If power from Suppliers is lost, Department will be able to contact owner/operator of 69 kV supply lines via supplier owned, microwave system.
iii)   In the event of power outages, customers able to reach utility in a few minutes by car or on foot even if phone system fails.
iv)   City has provided resources as needed for Y2K readiness.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	>$262k
Control Area	
System peak Load:	2MW
Load Characteristics:	
No. of Residential Customers	428
No. of Commercial Customers	78
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	2 - 4160 V

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility D gets its power from two suppliers. The power is wheeled over a transmission company's 69 kV lines.
- The utility used to have three diesel generators but these have been scrapped or sold.
- Utility D is a small city, where all live almost within walking distance of the utility department's offices.
- A nursing home and the phone company are two loads considered critical by the utility.
- The utility has a load management system for peak shaving. The system controls water heaters but nothing else. It has no other digital equipment in its system.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- City council approved the Y2K plan in November 1998.

(Role of outside consultants, auditors and their roles)

- None

3.2 Assessment strategy
(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Inventory was identified based on know-how.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- The load management system is handled by an outside firm under a service contract.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- The city has sent letters to critical suppliers to inquire about Y2K readiness. Most have responded but not all. The Telephone Company is one that has not sent a reply.

3.3 Test strategy and procedures
(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Nothing has been tested by Utility D itself because there is nothing to test except the load management system,

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and

complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Nothing to remedy.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

Load Type	% of system peak load or MW
Nursing home	NA
Phone company	NA

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Nothing done because there is no equipment in need of testing or remediation.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- The suppliers pick up the city's load as a block. No curtailment expected. The City has no control over the 69 kV breakers.
- Transmission Company installed a new SCADA system for its 69 kV system in June 1999 and it should be fully operational in August 1999.
- If Utility D needs to contact Transmission Company or a control center operated by one of the suppliers, it can use a microwave phone link owned by the supplier. The phone is available in the 69 kV receiving station.
- Construction and maintenance work for the City is outsourced. This organization has staff available in the city (on call) during the New Year time period in the same way as it has people available every day.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility D is Y2K ready.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Utility D has records of letters received from suppliers and customers as well as letters sent out to suppliers and customers. That is, the files appear to be in order.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Nothing to review.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

Nothing to test.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

- No one to interview, except the General Manager, who provided the information. The city has four employees in the utility department.

5.2 Interview #2 –

6. List of Key People Participating in the Assessment

6.1 Utility people

- City Finance Officer
- Utility D Department Superintendent
- Construction and Maintenance Organization representative
- Transmission Company representative
- Supplier #1 representative
- Supplier #2 representative

Organization Visited: Utility E

1. Year 2000 Readiness Evaluation

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the phone review, the assessor evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessor assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Well conceived Y2K plan
ii)   Completed inventory and assessment, 90% complete remediation & testing
iii)   Have tested all mission critical devices that are testable
iv)   Will do additional testing of some devices based on an expanded testing scenario.
v)   Identified key suppliers and are working with them to ensure supply through critical Y2K periods.
vi)   Without Y2K verification from vendor, equipment needs to be addressed in Contingency Plan.
vii)   Contingency Plan needs to be expanded in the areas of back up telecommunications and plan for extended outages.

2. Profile of Utility

2.1 General Information

Utility Type:	Municipal
Annual Gross Revenue (1994):	$2,995k
Control Area	
System peak Load:	12MW Summer peaking
Number of customers:	
No. of Residential Customers	1088
No. of Commercial Customers	22
No. of Industrial Customers	49
No. of Other Customers	4
Number of substations	1

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility owns and operates six generators dating from the 1930's. These generators are kept in operating condition as a backup in case of power loss from their supplier. They can be used to self generate power for the city, if they lose power from their supplier during the Y2k transition.
- Latest generator addition in 1987. Most of the control and monitoring equipment predates digital computers and is therefore not impacted by the year 2000-date change.
- Utility's generators are required for black start of plant. The utility has experienced complete loss of supply for up to 7 hours due to storms, which tripped the single 69 kV line connecting Utility E to their power supplier's system.

3. Year 2000 Readiness History

3.1 Y2K Project Information

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The Electric Superintendent attended a meeting of the Board of Directors for Municipal Electric Utilities in the fall of 1998 and heard a presentation about the legalities and ramifications of the Year 2000 problem. In the October – November 1998 time frame he obtained approval from the Utilities Commission to engage a consultant to assist with the management of the Year 2000 project. The impetus for the Y2K project was generated by him. There was not a citywide Y2K project.

- The utility employs six full time people to operate the system. Most of the Year 2000 work has been handled by the Electric Superintendent and the Plant Engineer for Maintenance and Operation. The two above along with the meter technician comprise the Electric Department's Y2K project team. The Y2k effort was base on the published Y2K guidelines from the APPA .

- There is no formal Y2K budget for the Electric Department. Any Y2K expenditure not covered by the O&M budget is approved by the Utilities Commission. There have been no problems getting the necessary funding for Y2K related items.

(Role of outside consultants, auditors and their roles)

- An energy and environment consultant firm was hired to assist the Year 2000 project effort.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Inventory list was prepared from walkthroughs of the substation and generation plant. Equipment lists and personal knowledge were used to determine inventory for equipment installed on the lines.
- The inventory included all devices and systems that may possibly be Y2K dependent. That is, it included electromechanical devices as well as those controlled by digital processors.
- Inventory was ranked with the help of the consultant as critical and important.
- Critical if it could prevent Utility E from delivering power to their customers.

- Important if power could still be delivered without the device/system.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- All suppliers of possible Y2K dependent devices and systems were sent letters seeking information on Y2K status.
- All devices and systems that could be tested were.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

The team identified the critical suppliers as follows:

- Power supply
- Alternative fuel for some of the generators
- Lubrication oil
- Cooling water
- Diesel fuel for generators
- Spare parts for generators
- Ditto
- Ditto
- Radio communication gear
- Phone service
- Billing software

Letters requesting Year 2000 compliance information were sent to the suppliers listed above. A few suppliers have still not responded. This needs to be followed up.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- All equipment that could be tested was selected for testing by Utility E personnel. In case of non-digital equipment, which is not testable, the utility relied on manufacturers' information.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Test procedures[1] included testing of 9/9/99, 12/31/99 to 1/1/00 transition and 2/29/99 (leap year test[2]). The test addressed embedded controllers, which are stand-alone pieces of equipment, which require no integrated testing. Also, Utility E lacks resources for exercising a critical function simultaneously with a time transition. Utility E is relying on the manufacturer for this information.

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[1] It was noted that transition from year 1999 to 2000 with power off was not executed. This led to scheduling of some retesting which is expected to be completed before 6/30/99.
[2] Leap year not tested for a capacitor bank controller. This will be tested.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- The strategy is to replace or upgrade the device/system where this is feasible and to "live with the problem" where a Y2K problem does not impact operation (manual adjustment to correct time error).Examples are:

  - An office computer, which was too old to be useful, was replaced.
  - An ABB relay rolls over to year 1900 instead of 2000. This will be manually reset to year 2000 since the problem does not affect the functionality of the device. Leap year will be handled in the same way.
  - Software for billing (not mission critical) is being replaced later this year by the vendor.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Two thirds of the load is industrial/commercial. Approximately 2,200 people are employed by the industrial plants which are served by Utility E.

Food processing plant	15% of load
Automotive parts manufacturer	8% of load
Furniture maker	35% of load
Creamery (new load)	2 MW expected load
Hospital	Has back up generation

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- There have been no internal or external audits of the electric department's Y2K program. The electric department works closely with their power supplier on all power issues pertinent to Y2K. A recommendation was made to work with them on the upcoming 9/9/99 drill. Based on the Review Team's observation, the electric department will institute procedures to ensure the Y2K readiness state is maintained.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility E has experience form past major outages in which the supply from was lost for extended periods of time. (See 2.2 above.) All six employees are trained to operate the generating plant. The plants operate 6 to 7 hours per month so all training is current. Also, for the transition into January 1, 2000, the plan is to operate the generators so that the expected load will be covered by local generation. The major contingencies identified are as follows:

    i)   Loss of power supply from supplier.
    ii) Ability to store additional fuel to support continued operation of generators for longer than 70 hours.
    iii) Failure of Utility E to provide black start capability for _____.

- The existing plan is for load shedding based upon discussions with their major customers. It needs to be expanded for to include the following Y2K considerations.

    - Cooling water is available to run the generators until power can be made available to Utility E's water system to resume supply of water.
    - Diesel fuel is available to run the generators with 100% diesel fuel for about 3 days and storage of additional diesel fuel is being discussed[3]. The fuel suppler is 45 miles away.
    - Availability of natural gas would extend the horizon for self-generation. The diesel fuel would last a week if gas were available. The gas supplier is 15 miles away.
    - Load shedding[4] is planned if the generation capacity is insufficient to cover an extended outage or if peak load exceeds generation capacity.
    - Some capacitor banks for reactive power compensation may be taken out of service as a precaution to avoid irregular switching of the banks if the controllers malfunction in spite of having passed year 2000 tests.
    - Communication system for internal communication is available even if the phone system is inoperable, but communication would be severed without public telephone[5] connections being available. However, a radio link to the power supplier is available from a local cooperative two blocks away.
    - Utility E has been in discussions to set up a backup communication system.
- Staffing for 12/31/99. The electric department intends to have all employees working during the transition to 1/1/00.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility is well positioned to complete necessary testing and remediation of all mission critical systems by June 30, 1999.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- The documentation related to the Y2K project is organized in a single binder, and appears to be up to date and complete.[6] It is updated on an as needed basis.

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[3] The assessors suggested planning for a longer time horizon. This will also help focus attention on other, possibly more likely disaster scenarios.
[4] The load shedding strategy had been worked out in consultation with the major customers.
[5] Overload of public phone systems is a recurring phenomenon in other types of disasters and could be likely for the Year 2000 transition.
[6] Minor matters of more editorial nature was noted and suggestions made to Utility E.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- All mission critical systems and devices had been tested. A very small amount of retesting was suggested as a result of the audit. This included correction of the definition for one of the test steps to check transfer from 1999 into 2000 with the power off. This tests internal clocks and should catch discrepancies between internal clocks and other time functions in the application software. The test record appeared to be complete.

4.4 Retest of Selected Equipment/Systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Two pieces of equipment were retested. One was a totalizer, which is used to check the loading of the system prior to a black start following a major outage. The other was a capacitor switch controller. Some expanded testing was done on these systems that uncovered some idiosyncrasies in the software. With the exception of the test procedure change noted in 4.3 above, no changes in Year 2000 test procedures are needed.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Superintendent

- Was open and confident in the results of the Y2K work. His major Y2K concerns were:
- Missed a Y2K dependent device or system, and loss of supply from the power supplier .

5.2 Interview #2 – *name and title of person interviewed*

Plant Engineer

- Will rerun the Y2K tests based on the testing discussed in 4.3, and shared the Superintendent's concerns as noted above.

6. List of Key People participating in the Assessment

6.1 Utility people

- Superintendent
- Plant Engineer
- Consultant (phone interview)

Also briefed the following individuals at the wrap up session:

- Mayor
- Member of Utility Commission
- City Clerk

Utility Visited: Utility F

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the phone review, the assessor evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessor assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Utility F has no Y2K - related mission critical equipment
ii)   Power Supplier provides the power and in case of a system-wide outage, also restores power to Utility F as a block
iii)   Although formal plans have not been prepared, the system is small and so well known so the lack of documentation should not be a significant factor in dealing with Y2K problems although more formal documentation might be helpful to prove due diligence
iv)   Adequate resources made available for remediation or replacement of office computer systems
v)   General Manager leading the Y2K effort

2. Profile of Utility

2.1 General statistical information

Utility Type:	Cooperative
Annual Gross Revenue:	$1.4M
Control Area	
System peak Load:	6,392 kW
Load Characteristics:	
No. of Residential Customers	1173
No. of Commercial Customers	179
No. of Industrial Customers	
No. of Other Customers	253 irrigation plus 3
Number of Substations	1

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility F obtains 100 % of its power from Power Supplier.
- The system is old and therefore has not installed any modern, digitally controlled equipment.
- The load is predominately residential with farms accounting for about 50% of the load.
- Utility F has two connections to power Supplier. However, if the Power Supplier's lines were to relay out, 50% of the load might be possible to serve via another utility's line.
- The Y2K effort originated from within. The impetus for the effort came from news media reports about the problems.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The Y2K effort started about 2 years ago. General Manager is personally leading the Y2K effort.

(Role of outside consultants, auditors and their roles)

- No outside consultants have been used for any mission critical equipment.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- There is no date sensitive, mission critical digital equipment in the system. The determination was based on know-how. General Manger has been with the utility for 28 years.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Non-mission critical equipment and systems have been assessed based on information from vendors. This has been obtained via phone calls.
- Phone contacts have been made with Power Supplier and another utility, which wheels some of the power. Same with phone service providers; public and cell phone systems. Others have not been contacted, but inventory levels have been increased.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Not applicable since there is no date sensitive, mission critical equipment.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- The strategy for non-mission critical equipment has been to upgrade or replace. A budget of $80k was set up in 1998 for upgrading office computer systems.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

Load Type	% of system peak load or MW
Residential (farms 50%)	
Radar site	
Schools	
Four small firms incl. hospital	

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- No independent review performed.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system –overloads etc.)

- A 15-year-old plan for load curtailment is available but probably not applicable for the Y2K transition.
- No other formal plan prepared. If power is lost, Power Supplier will restore the system as a block.
- Extra staffing planned for staffing of office on new years eve 1999. Also, two people will be on stand-by for fixing problems if any.
- Driving to nearest Power Supplier owned facility is plan to deal with loss of communications with Power Supplier.
- Can serve 50% of load via another utility's lines if Power Supplier's supply fails.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility has no date sensitive mission critical equipment and is therefore Y2K ready.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Only document reviewed is a response letter to a FAA inquiry about Utility F's Y2K readiness. This letter is informative.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No tests run because there is no mission critical, date sensitive equipment.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Not applicable.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*
(Impressions from interview; concerns and or convictions and reasons for these)

Utility F's Manager (phone interview)

- No concerns for the Y2K transition.

5.2 Interview #2 – *name and title of person interviewed*

6. List of Key People Participating in the Assessment

6.1 Utility people

- Utility F's Manager

<u>Organization Visited: Utility G</u>

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3: Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)	No mission critical, date dependent equipment in power system.
ii)	Strong commitment to addressing Y2K issues
iii)	Self-sufficiency in generation for loads expected at Y2K rollover with >30 days supply of fuel
iv)	Intentionally deferred acquisition of SCADA until after 1/1/2000
v)	Need to complete and document contingency plan

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	
Control Area	
System peak Load:	10 MW
Load Characteristics:	1805 customers, 1/3 industrial, 1/3 commercial, 1/3 residential
No. of Residential Customers	
No. of Commercial Customers	
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	1 with 69KV in and 25 KV out

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- They have 30 days supply of fuel at all times for peak load levels. This translates to 60 to 90 days supply for off peak. (They normally generate only about 5% of their load, mainly for voltage support. The town is located near the end of the supplier's transmission system.)

- Their peak load is 10 MW both summer and winter peak.

- They have no SCADA, but plan to acquire one in summer of 2000. The acquisition of the SCADA was intentionally delayed until after the Y2K problem was over.

- They are installing 3 1800 KW units. One has already been installed. One is due for installation November 1999; the third is due for installation summer of 2000.

- Reliability is an economic development issue for the town. Their total outage time since 1993 has been 20 minutes.

- There are two major/critical loads:

    1. A food processing plant taking 1/3 of the load when operating. They do not run 24/7 and will be closed on New Years Eve. There is a 7 minute outage limit before they lose perishable product. The load is non-interruptable. The processing plant is actually just outside the town limits, but is a major contributor to the electric department revenue.

    2. A large assisted care retirement center taking 500 KW. Reliability is critical because the patients can't be moved to a relocation center.

    3. A large grocery store

- The town is also the emergency evacuation center for a major resort, a few miles away. The resort has a year round population several times that of the town and a summer population roughly two orders of magnitude larger than the town..

- The town has no formal communication interface to their supplier. Sometimes when they call for operational information, they are asked who they are and whether they are on the supplier's system. During the review, there was an operational emergency due to temperatures over 100 degrees and other problems. The supplier initiated rotating blackouts. The town's electric superintendent reported that he could not get consistent answers from the supplier's dispatch regarding the town's status in the rotating blackout plan.

- In general, the electric superintendent expressed a major concern about the increasing reluctance of the supplier to share operational information, even on a near term (e.g., one hour) basis.

- Although the town's contract allows them to become members of the ISO/Poolco, they have not done so for reasons related to the restructuring.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

(Role of outside consultants, auditors and their roles)

- The town's Y2K effort began in October 1997 after replacement of the Town Hall computers. A Y2K consultant was hired. The Town Manager took the role of Y2K Coordinator.

- Budgeting has been out of operating expenses. There have been no remediation costs, although there were numerous non-Y2K-specific upgrades that helped. The town has been pro-active on Y2K. For example, they were a beta test site for the Y2K revisions by a vendor of software used on the town server.

- Governance of the electric department is by the Mayor and Council. There is a Utility Commission that has an advisory role on policy, but is not directly in a governing relationship.

- The town also is regulated by the relevant state Public Service Commission, which has been requiring utilities under its jurisdiction to report on Y2K readiness and Y2k contingency plans. The town has made one report, and another including written contingency plans was due to the PSC about a week after the review.

- The town contracts with an engineering firm to serve as City Electrical Engineer.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

(Assessment strategy/ testing- relied on vendor information sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- The inventory process for the town was a site-specific walkthrough by each department head with the consultant.

- For the electric system, with a few exceptions, all equipment is electromechanical. The exceptions are as follows:

    1. A Sentry Totalizer for metering and generation data logging. Output of the unit is to a printer. They have a letter from their engineer (the contracted City Electrical Engineer) to the effect that the device is not date dependent and is Y2K ready as used.

    2. The three 1800 KW generators being installed have (optional) non-date-dependent microprocessor controls. When initially delivered the first unit had only

electromechanical controls. The microprocessor controller was added later. There is a manual override on the unit to return to manual, electro-mechanical control. The generators were supplied under a contract that required Y2K compliance. This compliance was documented by the supplier to the City Electrical Engineer and was tested by the City Electrical Engineer as part of the acceptance procedure for the unit. The second unit is due for installation in November 1999.

3. There was a PC at the power plant that was tested by the consultant and found to be non-Y2K-ready. The original purpose of the PC was to serve as a terminal to the Town server for viewing of work orders. The PC has fallen into disuse because the business processes in the electric department do not require viewing of work orders from the power plant.

- Letters were written to each supplier of equipment or services to the town, a total of 140 vendors. Replies are evaluated by the Town Manager.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Except as noted above, no testing was performed.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units;)

- No remediation was required except for retirement of the unused PC.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition form year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- The town has used a newsletter and web site to communicate Y2K readiness. They are also planning to use their local access cable channel for public education regarding Y2K. They have prepared a standard letter for response to inquiries regarding Y2K.

- Outage calls go to the town emergency number (police dispatch). Personnel are contacted by phone, cell phone, pager, and radio. The town uses a Centrex system that Bell Atlantic has reported to be Y2K ready. The radio system has a backup generator.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- The only external review of the town's Y2K readiness is by the state PSC.

- The town has already deferred acquisition of their SCADA until after Y2K rollover and is purchasing their new generators under a contract requiring Y2K readiness.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- They intend to staff the power plant and have their generators spinning at Y2K rollover. Otherwise, contingency plans have not been written, but are due at the state PSC in written form 9 days after this review.
- They have a load shedding plan, but with only three circuits in the town, there is not much flexibility in the plan.
- Prior to this review they did not intend to engage in communications with the supplier or the ISO/Poolco. As a result of the review they are considering establishing such communications and participating in the 9/9/1999 exercise.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The general position of the town Electric Department is that they are Y2K ready.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Supplier letters and documents were reviewed, as were the report to the Mayor and Council and the response to the state PSC. The existence of the microprocessor generation controls arose late in the review as a result of a question arising from the review of the consultant report. (There was a note in the report regarding future installation of a Windows PC to control the new generators.) Documents related to the City Electrical Engineer efforts in confirming Y2K readiness of the generation controls during the acceptance process were not reviewed.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No test records were reviewed.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- No equipment retests were run.

5. Interviews

- The only people interviewed were the Utility Manager, Town Administrative Director, and consultant.

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

5.2 Interview #2 –

6. List of Key People Participating in the Assessment

6.1 Utility people

- Town Manager and Y2K Coordinator
- Utility Manager
- Y2K Consultant

Organization Visited: Utility H

1. Year 2000 Readiness

(Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

      i)   All mission critical electrical utility department equipment is Year-2000 ready.
      ii)   Power Suppliers (two) provide power to Utility H – no local generation in Utility H except for office backup power supply.
      iii)   Y2K effort managed by City Finance Officer
      iv)   Adequate resources made available to address Y2K issues
      v)   Informal contingency plan

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	$1.5M
Control Area	
System peak Load:	9,305 (winter)

Load Characteristics:

No. of Residential Customers	1593
No. of Commercial Customers	349
No. of Industrial Customers	
No. of Other Customers	

Number of Substations	

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility H depends entirely on power from the outside. Utility H is small, covers basically residences, a few restaurants and other commercial businesses.
- Utility H has been converting its 5 kV systems to 13 kV. This has led to recent installation of some new 13 kV reclosers, which were purchased to be Y2K ready.
- Outage reporting is manual; no computer for tracking or logging of outages.
- Utility H's load is small so it will be restored as a block if Power Supplier's lines relay out. Curtailment or brownouts are not planned or expected.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The City's Finance Officer initiated the project some time ago. Could not recall when it started but the Finance Officer directed that all of the City Departments look at what they had, which could be Y2K sensitive and get it fixed. No budget was established for the effort, which just came out of normal operating budget.
- The City Council has not been asked for a formal plan nor for formal feedback but does ask now and then if things are OK. Very informal approach.

(Role of outside consultants, auditors and their roles)

- There have been no outside consultants but testing of radio equipment and PCs have been done by outside organizations.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- The inventory process was basically Know-how. The system is so small and has so little equipment so people know what is installed.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Newly purchased reclosers have been specified to be Y2K ready (no purchase specification available for review so this is an oral statement). However, vendor information showing Y2K ready equipment was produced upon request. Radio system was tested by Motorola for the police and utility departments.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- The City's Finance Officer has used phone calls to the key suppliers as the method to obtain Y2K ready information. This has been done with power providers, phone companies, fuel; suppliers for trucks and other vehicles etc.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Besides the three reclosers, there is nothing with embedded chips in the electric utility system. This was not tested by Utility H, which relied on vendor data for Y2K readiness assessments.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- None; supplied by others

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Nothing needed remediation.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- No information available. The commercial load is basically hotels, shops, restaurants, gas stations etc.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- There has been no quality control. The oral reports by the department "mangers" have been the only feedback to the Finance Officer. This would be totally inadequate if it were not for the fact that Utility H only has three reclosures with embedded chips and these have been properly assessed.
- The electric utility department has four employees, one of whom is the manager.
- The department is not in position to do any planning or testing on their own. Thus, had it not been that the three reclosers are ready, Utility H would or could have been in trouble in regards to being Y2K ready.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility H has no contingency plan except it will have staff available to handle interruptions and outages as usual. The other employees can be called in if needed.
- f power is lost to Utility H, one of the Power Suppliers will have to restore power and will pick up Utility H as a block. (The major Power Supplier plans to have people in the substations, which probably includes the 138 kV substation feeding Utility H.)
- The customers can walk to Utility H, if needed, to report outages. It is a very small town.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The electric utility department is Y2K ready.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- There were no documents to review except the compliance letter from the vendor for the reclosures.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Nothing to review.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Nothing to test for which there was a test plan. The reclosers are of a type that we have tested elsewhere.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

- None except for discussions with the two individuals listed below.

5.2 Interview #2 – *name and title of person interviewed*

6. List of Key People Participating in the Assessment

6.1 Utility people

- City Finance Officer
- Manager, Electric Department

Organization Visited: Utility I

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Staff is very knowledgeable and can respond effectively
ii)   Y2K program is geared to size and capability of utility
iii)   Utility has a Y2K contingency plan that has been accepted by the Board and staff
iv)   Utility has confirmed Y2K readiness of principal critical systems
v)   Utility's inventory list covers items critical to delivery of electricity
vi)   Y2K project files are complete in a centralized location
vii)   Staff is well informed and cooperative with the Y2K Coordinator

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipality
Annual Gross Revenue:	10,680,000 (1997)
Control Area	
System peak Load:	4.5 MW
Load Characteristics:	
No. of Residential Customers	2,105
No. of Commercial Customers	225
No. of Industrial Customers	18
No. of Other Customers	62

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility I distribution system consists of one substation that receives energy from a 69Kv transmission line owned by a larger utility, Utility Y. Utility Y also owns the "high-side" equipment in the substation up to Utility I's transformer. Utility I's substation also contains a 1 MW emergency generator that they are in the process of retrofitting for black start capability. Utility I's largest industrial customer is a paper mill that owns the115kV substation serving them. Utility Y's 115kV transmission line feeds this substation and its operation is completely independent of Utility I's system.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Utility I has formed a three person team to address Y2K readiness. The team is comprised of upper management, and internal and external operations personnel. This team has adequate labor and capital budget authorization from the board. The team provides Y2K status updates for monthly board meetings.

(Role of outside consultants, auditors and their roles)

- Utility I has contracted an outside consultant to retrofit their 1MW diesel generator for black start capability in the event of a Y2K related or other loss of power from their supplier. Utility I has not required the assistance of external consultants for their Y2K readiness efforts.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Utility I has compiled an inventory spreadsheet of mission critical software and hardware based on knowledge of the distribution system and inspection of the substation. This spreadsheet includes columns for risk level (high, medium, low), readiness status and compliance request status.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Utility I is currently relying on vendor compliance statements and third party confirmation of readiness for the single mission critical device that was identified (an ABB DPU2000 relay used as a recloser controller). This device is also scheduled for Y2K testing during an upcoming planned outage for the feeder it serves.
- Y2K rollover testing has been done on office PC's which are listed as "low" risk level on Utility I's inventory list.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Utility I has identified their power supplier, phone service provider, and diesel fuel sources as critical suppliers and is gathering Y2K readiness statements from them.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility I has prioritized testing based on highest business impact and expedience of the test procedure. The single device identified as critical to the distribution of electricity has been scheduled for testing to coincide with planned maintenance on the feeder it serves. The manufacturers recommended procedure for testing will be followed.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units

- Utility I has received and installed an upgrade to their CIS system. This was the only business critical system requiring remediation that was identified.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility I has sent copies of their contingency plan to any customer requests for Utility I's readiness status. Utility I is not concerned about irrational behavior of their customers causing trouble with the distribution system. Most of their large loads normally discontinue operations in the evenings on a daily basis.

3.6 Quality control to ensure that Y2K readiness is achieved and maintined

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility I has no plans to purchase any processor controlled mission critical devices prior to the year 2000. Utility I will request Y2K compliance for future purchases of such devices.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility I's contingency plan addresses loss of power from their supplier and provides for emergency shelters and critical loads from the 1MW diesel generator in their substation. The generator is fed by a 5,000 gallon fuel tank and the energizing of two sources of fuel is included in the contingency plan. Utility I is in the process of augmenting the plan to include contingency for communications in the event of a public switched telephone network failure.
- Utility I's contingency plan also addresses adequate staffing for New Year's Eve.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility I is serious about maintaining and augmenting their Y2K readiness status. Considerable effort has been given to developing a thorough contingency plan and ensuring that all mission critical systems are Y2K ready.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Utility I has a three-ring binder with a Y2K inventory list, vendor statements, customer correspondence, insurance statements and other Y2K documentation. Utility I's inventory list includes columns for assessment of inventory items and for tracking the status of compliance requests and readiness.
- The Y2K binder also contains Utility I's contingency plan. Utility I's operations staff created this plan and have received full board approval for it.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No mission critical systems were tested to date. Utility I has line distribution devices with potential for Y2K related failures. An ABB DPU2000 recloser controller and a Cooper C4L regulator controller. Utility I has manufacturer compliance statements on these devices and can easily bypass them if needed.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- No mission critical systems were tested. No retesting was performed.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*
(Impressions from interview; concerns and or convictions and reasons for these)

External Operations Manager

- Is comfortable with Utility I's Y2K readiness status. He is confident that Utility I's contingency plan adequately addresses possible Y2K problems. This plan includes distribution of electricity to community shelters using the substation's 1MW emergency generator in the event of loss of power from Utility I's power supplier.

5.2 Interview #2 – *name and title of person interviewed*

Office Supervisor

- Has confidence in the ability of the operations staff to address Y2K issues. No concerns regarding Y2K.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- Manager's main concern is that power from supplier may be interrupted.

6. List of Key People Participating in the Assessment

6.1 Utility people

Organization Visited: Utility J

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   No mission-critical, date-dependent equipment in existing system
ii)   No generation capacity; dependent on supplier
iii)   Need to verify Y2K readiness of newly-installed equipment not yet in service
iv)   Need to complete and document Y2K contingency plan

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	
Control Area	A major IOU
System peak Load:	27 MW non-coincident
Load Characteristics:	
No. of Residential Customers	2400
No. of Commercial Customers	400 Commercial/Industrial
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	2

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- The utility has 2 substations and a 27 MW non-coincident summer peak. The major loads are:

- A hatchery
- A manufacturing company facility
- A lodging complex
- A store.

- There is no date dependent equipment currently in the power system. One piece of microprocessor-based equipment has been installed but will not become operational until it has been programmed for operational use and tested for Y2K readiness.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

(Role of outside consultants, auditors and their roles)

- The Y2K effort began when the Governor and the Public Service Commission sent out notices regarding Y2K. The Electric Superintendent, who is also Director of Public Works, was named the City Y2K Coordinator by the City Administrator.
- As Y2K Coordinator, he heads citywide team including all city departments as well as the hospital and the National Guard Armory (which is the City contingency site.
- Y2K is being budgeted out of current operations.
- The city contracts with an engineering firm as the City Electrical Engineer. An engineer from the engineering firm is participating in the Y2K efforts.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

(Assessment strategy/ testing- relied on vendor information sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- For performing the inventory, the electric superintendent consulted other cities, the multi-municipality agency, and the Internet. Personal knowledge was the means of determining the inventory. The criteria used were mission criticality and date dependence.
- Letters were sent to vendors. Vendor web pages were also consulted.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- There is only one piece of newly-installed mission-critical equipment requiring testing, an S&C tie line switch controller. The equipment has not yet been prepared for operation or made operational. The vendor has been queried, and the response is due in two weeks. Y2K tests will be run by the contracted City Electrical Engineer after the equipment has been prepared and prior to its being made operational.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- No remediation was required.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition form year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Press releases have been provided to local papers (one had been published the day before the review). The City plan to use its local cable channel to inform the public regarding Y2K, as well as providing information to TV stations in a nearby larger city, in whose TV market the city is located. Inquiries have been provided responses.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- The electric superintendent is the city Y2K coordinator and is in charge of any new equipment selection and installation.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- The city has a citywide, integrated contingency plan. The National Guard Armory is the city contingency focus site.

- If there is an outage, people call the police dispatcher. The dispatcher contacts the lineman on call. If the outage is major, the supervisor is called. The lineman and supervisor are called by landline and satellite-based pager. Personal knowledge is used to locate the fault. All trucks carry one-line diagrams of the power system.

- The city plans to use a telecommunications provider system as a backup communications medium to the IOU dispatch, which is the agent for the multi-municipality agency.

- They have a load shedding plan for cutbacks. They also have backup generators for critical areas such as police dispatch.

- There is an issue in the 911 system. The main 911 mux is at the County Sheriff's department. The switch identifies a phone number as being City and relays the call through fiber to the City police dispatcher. The police chief has verbally requested Y2K information from the Sheriff. The 911 mux is not Y2K compliant. The Sheriff is procuring a new 911 mux to be installed in a new facility to be operational by year-end. The 911 system is newly installed and the backup is for people to call the regular police dispatch number, which is generally habitual anyway until people become accustomed to calling 911.

- The electric department will have a crew on call at Y2k rollover until they feel safe.

- The city will participate with the multi-municipality agency in the 9/9/99 drill.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility is Y2K ready, but must maintain its readiness by testing newly installed equipment before making it operational.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Documents including vendor letters, the Y2K contingency plan were reviewed, and public communications (press release and published column in local newspaper) were reviewed.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- There were no test plans or records to review.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- No retests were observed.

5. Interviews

- There were no interviews other than with the Electric Superintendent. However, the final report was presented to the full City Y2K committee, and the City Administrator and City Clerk attended.

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

5.2 Interview #2 –

6. List of Key People Participating in the Assessment

6.1 Utility people

The Electric Superintendent

- The final report was presented to the full City Y2K committee, which included the Police and Fire Chiefs, and representatives from other city departments, the hospital, and National Guard Armory.

- The City Administrator and City Clerk attended.

Organization Visited: Utility K

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   The Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

    i)   Utility K's Y2K program has benefited from early upper level management support and acceptance.

    ii)   The 1997 storm provided experience with emergency situations including managing extended power supplier outages and communicating using alternatives to the public switched telephone network. Utility K proved that they could operate independent of their power supplier's computer system.

    iii)   Utility K has maintained regular communications with its customers to inform them of their Y2K efforts and status.

    iv)   Utility K has responded to customer and regulatory requests for Y2K information.

    v)   Utility K's distribution of electricity is not dependent on microprocessor control.

    vi)   Utility K has conducted a thorough inventory of their equipment using their property records database.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Distribution
Annual Gross Revenue:	
Control Area	
System peak Load:	
Load Characteristics:	
No. of Residential Customers	3800 (85%)
No. of Commercial Customers	7.5%
No. of Industrial Customers	7.5%
No. of Other Customers	0

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility K is 100% dependent on power purchased from a power provider. The power provider also owns all 12 substations serving Utility K's service area. The power provider also provides data processing services (billing) for Utility K. Most (85%) of Utility K's load is residential. Most of these residences are farm homes.

- In 1997, Utility K was hit by a major ice storm, blizzard and flood. This storm broke thousands of poles and disrupted energy from the power provider for 6 days. As a result many residences have installed emergency back-up generation and made other preparations in anticipation of possible future outages. (Utility K even installs manual transfer switches for new service drops as standard equipment.)

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Utility K formed a three person Y2K committee in March 1998. $25,000 was budgeted for Y2K activities and Utility K estimates that Y2K efforts will be completed within this budget. These efforts were initiated by Utility K's board.

- The Y2K team was comprised of:
    - Y2K Coordinator - Administration Manager
    - Journeyman/Linesman
    - Marketing and Service Representative

(Role of outside consultants, auditors and their roles)

- Utility K's consulting engineer also contributed to Utility K's Y2K readiness efforts.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- **Inventory:** Utility K used their property records database to generate a list of their inventory.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- **Assessment:** Each member of the Y2K committee reviewed the inventory list and highlighted all electronic items. The list of electronic items was then reduced to devices with clock/calendar functionality, and vendors were contacted for compliance documentation for those devices. No devices critical to distribution of electricity were identified with clock/calendar functionality.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- **Critical Suppliers:** Utility K's power supplier was identified as Utility K's biggest critical supplier. Utility K has worked closely with the power provider on Y2K readiness of the power provider owned substations and transmission equipment serving Utility K.

- The power provider also provides a significant portion of Utility K's IT support and has worked with communications suppliers US West, GTE, and Means, to achieve Y2K readiness. (Utility K has demonstrated ability to operate independently of these services during the 1997 storm.) Utility K uses services from these suppliers to communicate with their customers and to exchange data over frame relay with the power provider's computer system.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility K has applied a risk based priority test strategy. Their inventory and assessment process did not identify any date-sensitive microprocessor controlled devices that were critical to the operation of their electric distribution system. No testing of equipment was required for Y2K readiness of their distribution system. *-"There is nothing to test."*

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Utility K did perform testing on some non-critical devices such as a high voltage tester, only after eliminating critical devices as Y2K risks.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Utility K has not identified any devices requiring repair or replacement for Y2K readiness of their distribution system.
- Power provider is working with Utility K to achieve Y2K readiness of their office network hardware and software. Some non-critical PCs have been replaced or upgraded for Y2K compliance. The network servers' operating systems are also being upgraded for compliance.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility K has been active in keeping customers up to date with Y2K readiness activities:
  - Y2K was a topic of discussion at Utility K's annual public meeting held in April.
  - Utility K includes Y2K articles in their monthly newsletter, including publication of their Y2K readiness plan.
  - Utility K employees are often asked about Y2K readiness during daily work activities in the field.

3.6 Quality control

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- To ensure that Y2K readiness is achieved and maintained, Utility K includes a Y2K compliance request on all outgoing purchase orders.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility K's power supplier maintains a 60-day supply of coal. Utility K plans to react to possible Y2K problems using techniques and skills learned from the '97 storm emergency.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility K is confident that they are ready for Y2K at the time of the audit. They allocated $25,000 in 1998 for Y2K readiness and estimate that expenditures are well within the budget.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Utility K's inventory records appeared complete and well documented.
- Utility K's vendor and customer correspondence records appeared complete and well documented.
- Utility K's readiness plan was not detailed, but it was complete.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor

information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Utility K had no mission critical devices to test and therefore had no test records to review.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- None necessary

5. Interviews

5.1 Interview #1 –= *name and title of person interviewed*
(Impressions from interview; concerns and or convictions and reasons for these)

Marketing and Service Representative

- Had a positive attitude towards Y2K readiness and was confident with Utility K's readiness.

5.2 Interview #2 – *name and title of person interviewed*

Journeyman/Lineman

- Had a positive attitude towards Y2K readiness and was confident with Utility K's readiness.

5.3 Key Concerns of Utility Managers

- Utility K managers were mainly concerned with irrational behavior of survivalist extremists that may overreact to utility vehicles performing routine tasks such as meter reading or individual outage restoration.

6. List of Key People Participating in the Assessment

6.1 Utility people

Organization Visited: Utility L

1. Year 2000 Readiness

(Select Level 1, 2 or 3 from below; delete those that do not apply)

Based on the information gathered from the Phone Interview, the assessor evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessor assigned an overall level of risk as follows:

Level 3: Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i) Mission critical equipment new and all equipment Y2K ready.
ii) Communication links to Power Supplier tested early June; radio links from a local Power Supplier facility to the utility's crews assures communication to the power provider
iii) No local generation so utility depends on power from Power Supplier. If Power Supplier's supply of power is interrupted, system will be restored when Power Supplier reconnects the utility.
iv) If phone system breaks down, the city is so small that people can report outages by walking to the office.
v) Staffing plan for New Year's Eve will be prepared.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	5,495k
Control Area	
System peak Load:	22MW (summer)
Load Characteristics:	
No. of Residential Customers	3,600
No. of Commercial Customers	600
No. of Industrial Customers	2
No. of Other Customers	5
Number of Substations	1

Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility L gets all of its power from Power Supplier. Thus, if power supply is maintained, Utility L will have access to power on New Year 2000.
- Utility L has only electromechanical equipment for control and protection of the power system except for a newly built 161 kV substation. This substation includes new digital relays, which have been purchased for Y2K compliance.
- Utility L's radio equipment is Y2K ready.
- Utility L's internal phone system is Y2K ready although it may display the wrong date.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The assessment was started by the General Manager, who met with the superintendents of the electric, gas and water departments. The inventory process was basically a brainstorming session. However, there is only one substation, which is brand new, no reclosers used in the feeders and electromechanical timers used for control of four capacitor banks. Thus, for the electric distribution system, the inventory process was not difficult and the results could be relied upon.
- Utility L's manager reports to a three-member Board that is appointed by the Mayor and approved by the City Council. The Manager meets with the Board each month and has been requested by the City's insurance carrier to provide a written statement to the effect that Utility L is Y2K ready.

(Role of outside consultants, auditors and their roles)

- No external consultants have been used.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Brain storming session – see 3.1 above.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Vendor assurances have been used for brand new equipment but also for Utility L's phone system. Web site information was used to determine readiness of the Motorola supplied radio equipment.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Written requests have been sent to critical suppliers such as Power Supplier, Telephone Company etc. but the responses have been a standard letter that does not guarantee uninterrupted service when going into the Year 2000.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

No testing has been done by Utility L.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- New equipment has been purchased with requirements that it is Year 2000 ready.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Utility L has purchased all new PCs for its staff. It is upgrading its billing system and may change billing software. Both software packages are Y2K ready.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

Load Type	% of system peak load or MW
Light industry; 6 days and 24-hour operation although occasionally running 7 days.	3 MW (15% of load)

- Frequent contacts with the manufacturer to discuss a Year 2000 gas supply problem. No problem expected for the electric operations.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- No formal process in place. However, the utility is only a 40 person operation including the Manager. Thus, control of procurements and other changes is centralized.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public

communication systems and preparedness for phone system – including cellular system – overloads etc.)

- No formal contingency plan for Y2K in place. System curtailment plans in place in case Power Supplier needs to limit power supply. This entails rotating blackouts. System restoration is basically under Power Supplier's control. Power Supplier picks up the system as a block.
- Nursing home, water, sewer and schools on one feeder, which will be dropped last and picked up first in case of power supply shortages. Total load on this feeder about 6 MW.
- Staffing plan for New Yea's Even 1999 is not yet in place. Most likely staffing of key facilities will be chosen.
- Utility L did not participate in the April 9th NERC exercise but plans to participate in the September 9th exercise.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The mission critical functions are ready now.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Supplier letter for phone system reviewed. However, no other documents were available for review.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No tests done and therefore, no records available.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- None made.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

- Phone interview with General Manager

5.2 Interview #2 – *name and title of person interviewed*

6. List of Key People Participating in the Assessment

6.1 Utility people – General Manager

<u>Organization Visited: Utility M</u>

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

☒Level 2:   Company has some issues that cause concern for meeting NERC Y2K readiness date (6/30/99), but should be Y2K ready by 12/31/99. There is a need to continue to monitor the company's progress.

The assessors reached this conclusion based on the following insights:

i)   Utility M's Y2K program has strong upper management support and adequate staff to address major business areas.

ii)   Utility M has demonstrated a thorough knowledge of their electric system stemming from employees' long term commitment to their careers (e.g., Operations Superintendent has been with Utility M for 36 years.)

iii)   Utility M demonstrated early recognition of Y2K issues with readiness efforts beginning in 1993.

iv)   Utility M has documented a contingency plan that includes loss of power from supplier and black start of owned generation. Utility M can generate anticipated New Year's Eve load with dual fuel capability.

v)   Utility M's electric system has very few devises that contain microprocessors.

vi)   Utility M has received an independent report of Y2K readiness for the distribution system's protective devices.

vii)   Utility M has demonstrated a willingness to participate in industry-wide Y2K readiness efforts.

viii) Utility M's self estimated Y2K readiness date of 10/1/99 is due to SCADA readiness confirmation and further inventory documentation efforts underway.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue (Year):	7.2 million
Control Area	
System peak Load:	32.7 MW (1998)
Load Characteristics:	
No. of Customers	6,115
No. of Residential Customers	4,498
No. of Commercial Customers	832
No. of Industrial Customers	25

No. of Other Customers	754
Number of Substations:	4 main; 20 residential

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Two tie points to power supplier
- Black start capability
- 11 of 12 generators have dual fuel capability
- 200,000 gallons of storage fuel which can support
- 4 days of generation at estimated load of 25 MW

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Installed new CIS system (Orbcom) in 1993. Vendor said it may not be Y2K ready. This was the beginning of their awareness of Y2K issues. No Y2K budget was allocated.

(Role of outside consultants, auditors and their roles)

- Outside consultants assessed the Y2K readiness of the protective devices on the transmission and distribution system while performing a system wide protection coordination study.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Mental inventory of system components based on extensive knowledge of system by Utility M personnel. Tested mission critical devices that are microprocessor based.

Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Testing – SCADA: The clock/calendar of the SCADA master was rolled over to the Year 2000. This test revealed that the day of the week and the date did not correlate correctly.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Power
- Gas
- Phone
- Water – Self supplied
-
-
-
-

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Test strategy: test mission critical devices that are microprocessor based
- No formal test procedures; device rolled over into the Year 2000

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- 1972 work around strategy for SCADA
- Upgraded PBM
- Upgraded Itron

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility M participated in a public forum on Y2K with state and county emergency management offices. Have answered questions from customers on a call by call basis.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility M is postponing purchases of new equipment until after the Year 2000 transition. The exceptions to this are the purchases to upgrade to Y2K compliant versions.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility M will have enough storage fuel for 4 days of generation.

- Utility M will have a generator on line during the Year 2000 transition to ensure station power.

- The power plant will have extra staffing.

- The substation that has the interconnect to the power supplier will be manned.

- The General Manager and Service Superintendent will be at the utility's main office.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Continuing inventory documentation efforts are needed.

- No budget – as needed basis

- Confirmation of RTUs and master station BIOS – critical

- Utility M volunteered to work with the power supplier (April 9th drill)

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Y2K Readiness Report and Contingency Plan

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No test records

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Only mission critical device that was testable was SCADA, but didn't test system because of safety concerns.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Distribution Superintendent
- Was confident that the distribution system would not experience problems as a result of the Year 2000 transition.

5.2 Interview #2 –

Name: Title: Service Superintendent
- Has confidence in Utility M's Y2K readiness. Was comfortable accepting vendor assurance of Y2K readiness without testing for the Customer Service Department. Interviewee participated in discussions on contingency planning during regular company meetings. Has used emergency telephones during building power outages previously and feels confident using that same strategy in the event of an isolated power outage.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- Public panic causing problems that wouldn't otherwise happen.

6. List of Key People Participating in the Assessment

6.1 Utility people

- General Manager
- Operations Superintendent
- Distribution Superintendent
- Service Superintendent

<u>Organization Visited: Utility N</u>

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3: Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i) All mission critical equipment, including Utility N's portion of G&T's SCADA system is Y2K ready.
ii) Dual sources of power available to Utility N. One of the supply lines sufficient for meeting Utility N's anticipated needs.
iii) Appropriate resources applied to Y2K effort
iv) Disaster manual used as a basis for management of Y2K preparations. Specific staffing plan for the New Year 1999-2000 to be prepared.
v) Y2K program led by Utility N's Manager who reports to Board of Directors on the matter.

1. Profile of Utility

2.1 General statistical information

Utility Type:	Cooperative
Annual Gross Revenue:	$5.9M
Control Area	
System peak Load:	17,654 (winter)
Load Characteristics:	
No. of Residential Customers	4,592
No. of Commercial Customers	569
No. of Industrial Customers	Incl. In commercial
No. of Other Customers	48

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility N gets coal-based power from the northern side of its service area from Supplier. The power is wheeled via another utility's lines. Utility N gets water-based power from a second Supplier to a connection point at the Southern side of its service territory. A connecting line between the southern and northern systems is normally open but can be closed, and then the full load will be supplied from one of the two supply points.
- Utility N supplies primarily ranches and farms. Farmers have a lot of backup power on site. In particular dairy farmers have to be prepared to have backup generators for running milking machines. However, the service territory covers a couple of casinos and a hospital.
- A G&T is the virtual power provider. It buys power from two suppliers and resells it immediately. The G&T owns no lines but has a SCADA system from which it can control the transmissions system of its members.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The Y2K effort began in September 1998. PUC and NRECA inquiries pushed the issue.
- The Board formally adopted the Y2K plan at its February 99 meeting.
- General Manager personally leads the Y2K effort and team.
- General Manager reports to the Utility N's Board monthly as needed on the effort.

(Role of outside consultants, auditors and their roles)

- G&T has provided support to its members with Y2K readiness information. Most of this information has come from the equipment vendors to the G&T.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Brainstorming was used to identify the inventory. However, it has been an ongoing process to ensure that nothing has been overlooked[1]. Because the system basically is built with electromechanical controls, the digital inventory is small and readily identified.

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[1] Utility N is using electromechanical equipment for control and protection of the system. The Y2K sensitive inventory includes a SCADA system for control of the 69 kV system, some digital relays used only for fault location, a turtle system for meter readings, voltage recorders, telephone and radio systems. The SCADA computer is however, owned by G&T but an operator terminal in the Utility N's office and the RTUs are owned by the utility.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- The only mission critical system is the SCADA system. The SCADA system depends on leased lines, 900 MHz radio and microwave links for communication between the utility's office and the SCADA computer as well as between the computer and the RTUs.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Brainstorming was used to identify the key suppliers.
- Letters sent to suppliers and web pages used to establish Y2K readiness of suppliers.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Only the SCADA system has been tested jointly by Utility N and Power Management Company. The rest of the equipment was assessed using website information or other information from vendors or the G&T.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Integrated testing of communication system and computers have been run.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- No mission critical equipment in Utility N's system required remediation.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Monthly trade magazine that is distributed to all members has inserts for Utility N. It has included Y2K information. Also, an annual member meeting draws a good portion of the members. The plan is to use the upcoming meeting in the fall to provide further information about Y2K.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- No inside or outside auditors have been used.
- Utility N did not participate in the 4/9/99 exercise and does not plan to participate in the 9/9/99 exercise either.
- SCADA system may be replaced before end of year although the present system appears to be Y2K ready. (Passed all date tests - 9/9/99, 12/31/99[2] and 2/29/00.)

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system –overloads etc.)

- Utility N has a Statewide Disaster Plan, which is basis for establishing communications to deal with any disaster. It is neither specific for nor limited to Y2K. An inventory of people on life support has been prepared to guide planned outage activities.
- Staff is placed throughout the district. This staff would be available to deal with any outage including those that may occur on January 1, 2000.
- In case of problems with the public telephone system, the police typically relays outage information because many residences do not have access to phone service.
- No special staffing plan has been prepared for New Year's Eve 1999 but this will be considered.
- Fuel supply for vehicle fleet will be "topped off" before New Year.
- There has been no need for power curtailments in the past so there are no plans for curtailments.
- Radio link to State's Civil Defense organization is available.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility is Y2K ready.
- If the power from the two Power Suppliers is available, the probability that Utility N will see any disturbances caused by Y2K is virtually zero.
- Although there are some holes in the formal contingency plan, Utility N has the experience and resources to deal with disturbances caused by the Y2K "bug".

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- The documentation is contained in one three ring binder. The binder content appears to be relatively complete although test procedures for the SCADA system are omitted.

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[2] Only he 12/31/99 test results were found in the documents. A G&T representative had information that the other dates were tested and the documentation will be updated later.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- With exception for the SCADA system, most of the other assessments have been based on vendor testing or information from vendors' web pages and/or specific letters from vendors. The Power Management Company has obtained a lot of this information for its members. Thus, some of the information used by Utility N is received from the G&T. However, diagnostic programs have been run on Microsoft software and the results from these tests are included in the binder.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Voltage recorders were tested as an example of how testing should be done.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

General Manager, G&T

- G&T appears to be well prepared for Y2K. It only owns the SCADA master that is critical for Y2K readiness. It can control the 69 kV breakers but normally each member utility controls their own breakers. The supply side breakers are under the control of two utilities that own the lines.

- The General Manager has only one concern over Y2K which is that hackers are going to break into systems and create problems.

5.2 Interview #2 – *name and title of person interviewed*

5.3 Key Concerns of Utility Managers

- The utility's managers expressed no concerns for Y2K. They feel that they are ready.

6. List of Key People Participating in the Assessment

6.1 Utility people

- General Manager
- Operations Superintendent
- Metering

- General Manager, G&T

Organization Visited: Utility O

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company has met the NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

      i)   Strong commitment to be Y2K ready
      ii)   Tested all mission critical devices that are testable instead of relying on vendor assertions
      iii)   Contingency plan needs to be expanded and completed
      iv)   No generation capacity, therefore dependent on supplier

2. Profile of Utility

2.1 General statistical information

Utility Type:	Cooperative
Annual Gross Revenue (Year):	$25M
Reliability Area:	
System peak Load:	106 MW, winter load
Load Characteristics:	
No. of Residential Customers	6000
No. of Commercial Customers	400
No. of Industrial Customers	16
No. of Other Customers	-
Number of Substations:	6

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility O is one of fifteen electric cooperatives of their state that jointly own other cooperatives. The local power provider and these other cooperatives have a contractual agreement through which they buy more than half of the electricity Utility Z produces. The purchase of that wholesale power is made through another cooperative.

- The local paper mill accounts for 60% of Utility O's load.
- The neighboring city accounts for 20% of the utility's load; nursing homes in this city have several patients on life support systems.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The President & CEO, appointed a Project Manager in May, 1998 due to this person's business and technical background. Because of the small size of the organization, four full-time employees were assigned to the project. Each employee has experience in a specialized area such as engineering, customer service, and operations. It was also noted that there are no structured Y2K meetings. The project team believes this is not necessary due to the small size of the organization. Arising questions or concerns are brought to the Project Manager's attention. He then informally reports to the President on the Y2K status.
- There is no budget allocated to achieve Y2K readiness. No funding problems have been encountered to date.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Initially, the Project Manager inventoried substations by using own knowledge as well as NRECA guidelines. Everything ended up being included on the inventory list in the substations, from electromechanical to digital equipment. In terms of office equipment, the list included everything that may have been Y2K dependent.
- Documented definitions for degrees of criticality:
  - *Mission critical*: Failure could result in immediate disruption of service to members or create immediate safety concerns.
  - *Priority 1*: Failure could lead to disruption of service to members, prevent or hinder business operations, or create non-immediate safety concerns.
  - *Priority 2*: Failure would merely cause an inconvenience.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Letters were sent to all vendors of possible Y2K dependent devices to pursue information of Y2K status. On a large group of similar devices, only a couple were tested.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Gathered as much information as possible from web sites to vendor brochures on Y2K status. If not positive of status, would send a questionnaire to critical suppliers to pursue further information. Two critical suppliers were noted.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Overall, did not use a structured test process. BIOS and hardware items were first tested. Relied on vendor compliance letters for software applications as well as priority 1 and some priority 2 items. All the mission critical items were tested.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- 9/9/99, 12/31/99 to 1/1/00 transition, 10/9/00 to 10/10/00 transition, and 2/29/99 (leap year) were used for the testing dates. The only documentation for testing was the device, the date, and the result. Power off testing was not executed for any test, and therefore it was recommended that this be completed in the near future. No integrated testing was done due to stand-alone pieces of equipment. A device was designed by the Project Manager to simulate a trip on an ABB recloser. This was demonstrated successfully with a smooth Y2K transition.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- No mission critical devices needed remediation. The only priority 1 item that needed remediation was the phone system and that has been recently replaced with a Y2K ready system. It was noted that the phone provider needed to replace a non-compliant telephone switch. The tentative date for the repair was June 30, 1999. Utility O needs to check on status of switch.
- The current SCADA system is not Y2K compliant, but is only used for data acquisition at the substations and is therefore not mission critical. Tthe Project Manager stated that he has tested the rollover into Y2K and it did not cause an operational problem. That is, as long as the system did not need to be reset after the transition. If a reset does ensue after the transition, all communications would seize. The Project Manager noted that this could be bypassed as long as the system was manually set with a Y2K date (prior to 01/01/00) instead of the system clock rolling into a Y2K date. It was recommended that this functionality be fully documented.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition form year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- The paper mill accounts for 60% of the system load
- The nearby city accounts for 20% of the system load
- The rest of the load is primarily rural customers
- The status of Utility O's Y2K readiness was sent in letter form to customers who requested it
- The larger accounts receive letters on a continuing basis
- The utility's Y2K readiness letter was adapted from APPA Guidelines ans was also reviewed by another cooperative's legal counsel
- The State Disaster Planning Committee has requested information on Y2K readiness

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- To date, there have been no internal or external audits of Utility O's Y2K program. A recommendation was made to work with a cooperative member on the upcoming 9/9/99 drill. No formal procedure has been instituted to help maintain the current Y2K readiness. Therefore, it was also recommended that the entire organization ficus on ordering only Y2K compliant devices with proper documentation.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Communication priority:
    1. Land line
    2. Cellular
    3. Mobile radios to communicate with Cooperative A, who, in turn, can communicate with Cooperative B.
- Utility O has an emergency generator for back up power
- Y2K compliant GE Master II Base/Repeater for two way voice communication

- A documented contingency plan for Y2K has been started but needs much improvement. The current Y2K contingency plan incorporates the standard outage procedures due to storms. It needs to be updated for Y2K scenarios. Customer consideration needs to be implemented.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility has done well to complete the necessary testing of all mission critical systems by June 30, 1999. Participation in the NERC 9/9/99 drill would benefit the organization.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- A binder is used to organize the documentation pertaining to Utility O's Y2K program. A thorough list of vendor/supplier contacts was included, but it was noted that certain compliance request letters sent by Utility O were not included.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- There was no reliance on vendor Y2K compliance statements for mission critical devices. All mission critical devices were field tested, were Y2K compliant, and therefore needed no remediation. There was also a lack of documentation in test procedures. The only documentation for testing was the device, the date, and the result. Power off tests for internal clock functions for some of the computer systems was also recommended.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- See attached

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

Name: _____ Title: Operations Manager

5.2 Interview #2 –

Name: _____ Title: Mgr. of Marketing and Admin.

- Interviewee was very comfortable with the results of the Y2K project. He felt that the Project Manager had done an excellent job in identifying all system problems. Interviewee did not have any major concerns about Y2K.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- None

6. List of Key People Participating in the Assessment

6.1 Utility people

- Engineering Assistant
- Operations Manager
- Mgr. Of Marketing and Administration
- President & CEO
- Vice-President, Loss Control and Training

Organization Visited: Utility P

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

   i)   Utility P's electric distribution system has limited microprocessor-based devices (Relays)

   ii)   Utility P Electric has utilized external resources to review compliance information for their critical distribution devices (consultant).

   iii)   The City has contacted and reviewed Y2K information from their power suppliers.

   iv)   Utility P Electric provided Y2K status information to State Regulatory Commission.

   v)   The Electric Department provides regular Y2K status updates to the City Mayor, City Council, and Board of Works.

   vi)   Key electric department staff have attended external Y2K awareness and strategy information sessions.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue (Year):	
Control Area	
System peak Load:	88 MW (summer)
Load Characteristics:	
No. of Customers	6,095
No. of Residential Customers	5,210
No. of Commercial Customers	601
No. of Industrial Customers	284
No. of Other Customers	
Number of Substations:	5

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Electric Superintendent has been with the system for 30 years.
- The utility receives its power from Electric Provider.
- SEL Relays are the only microprocessor-based equipment identified in the inventory of distribution devices.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- A state questionnaire prompted the start of the Y2K project in Fall of 1998.
- Y2K team is formed.
- No formal Y2K budget – general operating fund.
- Utility P's consultant has provided guidance in some aspects of the project.

(Role of outside consultants, auditors and their roles)

- None

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Inventory is the same as general inventory (Database) of equipment in field and in stock.
- Obtained vendor compliance statements for microprocessor-based devices.
- Checked electromechanical equipment for dependencies.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Communications Provider
- Phone Provider
- Electric Provider

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- No testing has been performed.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- No remediation is needed.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- 80% of load is industrial/commercial

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- The utility's consultant has reviewed its efforts and provided guidance.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- The utility has made no Y2K contingency plans. The utility has a restoration plan if

transmission is lost and restored. The city will write a citywide contingency plan.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility's mission-critical systems were Y2K ready by June 30, 1999.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

One binder containing:
- Position statement by utility
- Vendor compliance statements
- Survey response from power supplier

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No testing performed.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- None

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

Name: _____ Title: <u>Superintendent</u>

_____

_____

5.2 Interview #2 –

Name: _____ Title: <u>Secretary</u>

_____

_____

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

6. List of Key People Participating in the Assessment

6.1 Utility people

Organization Visited: Utility Q

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   No mission-critical non-Y2K-ready equipment installed
ii)   Utility is not self-sufficient in generation and depends on primary supplier to meet almost all its power demand
iii)   Suggest that contingency plan be documented

2. Profile of Utility

2.1 General statistical information

Utility Type:	Cooperative
Annual Gross Revenue:	$6.3 million
Control Area	
System peak Load:	17.5 MW
Load Characteristics:	
No. of Residential Customers	5400 residential/farm including 250 dairy farms
No. of Commercial Customers	130
No. of Industrial Customers	2
No. of Other Customers	1761 seasonal
Number of Substations	8

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility has a SCADA but it is used only for data logging and regulatory reporting (FERC and the state Department of Natural Resources) on their small hydro plant and to monitor breaker status and health parameters (such as air pressure) of a nearby substation. No equipment is

controlled with the SCADA. The SCADA is non-Y2K-ready and is planned for replacement, but is not mission critical. The current SCADA is an ILEQ, but the replacement may be from another provider.

- Most of their generation comes from the IOU, who also provides services supporting the handling of outage calls. The outage call arrangement is as follows:

  - To report an outage a customer calls an 800 number. The number is routed by the telco to a IOU switch. During business hours, the IOU switch re-routes the call to the utility front desk, where it is routed by the utility attendant (using the office telephone switch at the utility) to the operations secretary who notofies the dispatch crew. If there is more than one call, the line superintendent is brought into the effort.

  - After business hours and on weekends, the IOU switch routes the call to a IOU call center. The call center prepares a trouble order, faxes it to the utility office and dispatches a lineman by phone or pager. The lineman calls in by radio.

- The customer information system has no role in outage response.

- There is very few microprocessor based equipment in the system.

- The budgeting for Y2K was approved in December. Funds are taken out of regular operations except for the SCADA replacement and meter-reading handheld devices.

- Most of the dairy farms have backup generators.

- There are no identifiable significant loads.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

(Role of outside consultants, auditors and their roles)

- The Y2K effort was started in summer of 1998 at the staff level. There are 3 people doing all the Y2K work:
  - The Y2K Coordinator who is also a member service representative
  - The General Manager
  - An Engineer

- Governance of the utility is by a Board elected by the Membership. Reports on Y2K readiness are made to the board quarterly. Reports are also made to the State and to NRECA.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

(Assessment strategy/ testing- relied on vendor information sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- The inventory was done by personal knowledge using the NRECA checklist as a guide. The inventory was not formally documented.

- Two devices were assessed by obtaining letters from providers. All other equipments were tested. There were no written test plans or test reports. The only date tested was the New Years rollover.

- The equipment was handled by letter were a voltage regulator panel (test observed, see below) and two Cooper 3-phase reclosers.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Testing was done for Y2K rollover only. The test procedures and test results were not formally documented.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- No remediation was required for mission-critical systems The SCADA is being replaced.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition form year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- They have responded to a few requests. Y2K has been discussed at board meetings and at the annual membership meeting.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- There is no formal quality control or outside audit. There is no separate purchasing department. The same people responsible for Y2K are also responsible for selecting and purchasing any new equipment.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- The contingency plan is not documented. The utility is substantially dependent on the IOU, so any contingency planning for power supply must be done by the IOU. The utility is picked up as a block during system restoration, so detailed planning for system restoration is not regarded as important. The utility has operating plans they use in storm situations and a written load shedding plan. They plan to expand these plans to accommodate Y2K. However, the General Manager does not want to prepare extensive documentation of the plans out of fear of getting tripped up legally if anything happens. At the time of the assessment, the GM's intent was to discuss the contingency plans at staff meetings only.

- The cooperatives in the state have a plan for restoration of power in emergencies that addresses mutual support including sharing of spare parts. The GM is comfortable with the anticipated inventory of spares in January and February and did not write letters to spares suppliers.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility has substantially completed its efforts overall and has completed its efforts for mission critical equipment. No letter has been written to the telephone company (one will be written), but a firm response is not expected. They have also not formally inquired regarding the Y2K readiness of the IOU call center and switch that processes their outage calls (as described above). However, they have made inquiries informally.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- There were very few documents to review other than the two vendor letters.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- There were no written test procedures to review.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- The only feasible test that could be rerun was the voltage regulator control panel, a Siemens AccuStat MJ-Q. Three tests were run. All three were power-on rollovers. The dates selected were the Y2K rollover (12/31/1999 to 1/1/2000) and the leap year rollovers (2/28/2000 to 2/29/2000 and 2/29/2000 to 3/1/2000). The equipment passed the Y2K rollover (which was the only one included in the original test by the utility). The equipment failed the 2/28 to 2/29 rollover, moving to 3/1 from 2/28. However, when the date was manually set to 2/29 it rolled over correctly to 3/1.

5. Interviews

- The meeting was conducted with the three members of the utility Y2K team. One member of the team, the Y2K Coordinator, is also a Member Service Representative.

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

5.2 Interview #2 –

6. List of Key People Participating in the Assessment

6.1 Utility people

- The Y2K coordinator (also a Member Service Representative)
- The General Manager
- An Engineer

Organization Visited: Utility R

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   There are no known mission-critical Y2K dependent devices in the electric system
ii)   Any Y2K uncertainty resides with the supplier of power
iii)   The city needs to complete the documentation of its contingency plan, including joint contingency planning with its power supplier

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	
Control Area	
System peak Load:	40 MW
Load Characteristics:	
No. of Residential Customers	
No. of Commercial Customers	
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- The city is a distributor and has no generation.
- There is no digital equipment in the distribution system.
- Major loads are:

- A plastics plant operating 24/7)
- A manufacturing plant
- A textile product plant
- An auto parts plant operating 24/7

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

(Role of outside consultants, auditors and their roles)

- Y2K preparation was initiated by the City Manager. The City Information Systems department head is in charge of the Y2K effort for the city overall. Each department within the city is looking at its own issues, under the IS department head's central direction.

- The Y2K effort reports directly to the City Manager who in turn reports to the Mayor and Council. The City Council meets monthly and the City Manager provides information that can be discussed if desired. The City Manager also can call the Mayor or council members during the month if matters are urgent.

- All staffing is in-house. Budgeting was out of existing funds unless more money was needed. If more money was needed a presentation was made to the City Council, which generally voted the funds. "Open checkbook" method.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

(Assessment strategy/ testing- relied on vendor information sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Inventory was done by the electric superintendent) using personal knowledge of the system. Only mission critical items were listed except for computer equipment. There were no mission critical items identified in the electric system. Note that the metering is digital but not mission critical. The metering system is the Turtle. They have a compliance letter from the supplier. Although Turtle is capable of being used for outage detection, the city does not use it for that purpose.

- Assessment was by letters to providers sent by the Assistant to the Electric Superintendent.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- There was no testing in the electric system because there was nothing to test.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units;)

- There was no remediation required.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition form year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- All loads in excess of about 25000 KW (actually 10 million KWH/month) are directly served by the utility. The city's largest loads are 3000 KW and 2000 KW. Neither the city nor its supplier see any problem if these loads dropped off due to PLC problems at Y2K rollover.

- The municipal utility's power supplier has the right to interrupt curtailable loads in a range of options beginning at 5 minutes.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Quality control is at City level. However, there is no separate purchasing department, so the electric superintendent has control over new equipment that is introduced into the system.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Contingency planning was ongoing but needed to be fully documented. A major issue is communication with the power supplier. Its internal telephone system is Y2K compliant.

- The power supplier will send out hourly status to all distributors starting 6 PM New Years Eve.

- The city is tied in with the power supplier's contingency plans. It has an emergency load curtailment plan with the following steps:

  1. Voluntary curtailment of in-house use at distributors
  2. Public appeal
  3. Voltage reduction
  4. Curtailment of interruptable loads
  5. Interrupt firm industrial loads (both direct serve and distributors)
  6. Rotating blackouts (30 minutes to residentials)

- The city has one hospital and it has a generator.

- The city plans to staff its substations by order of the City Manager, although this plan is not yet documented.

- The power supplier has three radio systems: Maintenance, Police, and Nuclear. It plans to use the maintenance radio to talk to the city.

- Currently, the communications backup is for the distributors go to a power supplier transmission substation having a power supplier radio carrying a distributor radio. The power supplier is upgrading its radio system and considering sending a power supplier truck to each distributor. The city will be issued a power supplier radio by 8/12/99.

- The city's police dispatcher can talk to the power supplier police dispatch. This is an additional backup identified in the assessment.

- The city will participate in the power supplier's communications drills to include the 9/9/99 NERC drill.

- The fax is used for some information, but the city's fax is not regarded as mission critical.

4. Position of the Utility at Time of Assessment

4.1   General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The Y2K work was completed at the time of the review, except for preparation of contingency plans.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Relevant documents are contained in a book centrally maintained for the City by the IS department manager. Documents reviewed mostly consisted of vendor letters/responses and customer inquiries/responses. There was a one page inventory/assessment of the electric department.

- The power supplier Customer Service Representative, was present at the review and provided the power supplier's presentation on Y2K readiness.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No test records were reviewed, there being nothing to test.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- No retests were conducted.

5. Interviews

- The electric system superintendent serves as both Electric and Customer Service Supervisor.

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

5.2 Interview #2 –

6. List of Key People Participating in the Assessment

6.1 Utility people

- The city IS Director
- The Utility Superintendent
- The Assistant to the Utility Superintendent
- The Customer Service Representative
- The City Manager (attended initial and final sessions)

Organization Visited: Utility S

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

- i) Compliance statements for all mission critical distribution system equipment inventoried
- ii) Confirmation of SCADA Y2K readiness
- iii) Awareness of key supplier status and contingency
- iv) Substation staffing for key dates

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue (Year):	40 M
Control Area	
System peak Load:	140 MW
Load Characteristics:	
No. of Customers	12,483
No. of Residential Customers	9065
No. of Commercial Customers	2698
No. of Industrial Customers	403
No. of Other Customers	316
Number of Substations:	9

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- The utility has one hydro plant for generation (5MW). It is expected this unit will be offline during key rollover dates, however the unit has been confirmed to be compliant. Utility S is

therefore dependent on its power supplier to meet its load. Power is purchased from Electricity Provider 1, but ultimately delivered by Electricity Provider 2.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The city initiated its Y2K efforts in 1996, viewing the problem as an issue that would affect their revenue stream. The program was expanded in 1998 to include all divisions. The code for computer systems has always used 4 digit dates and required few updates.

- The utility administrator is responsible for the Y2K readiness of the utility.

(Role of outside consultants, auditors and their roles)

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

3. The mission critical electric distribution microprocessor-based device inventory was identified through walkthroughs of the utility substations, purchasing inventory records and knowledge of the system. All microprocessor based equipment was identified regardless of criticality.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- The utility relied on vendor statements for compliance information and plans to test equipment later this year.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Utility S has contacted its critical suppliers for compliance information and ability to provide service through the Year 2000. This has been done centrally for the city by the Y2K Coordinator.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility S plans to do thorough testing on its mission critical distribution system equipment. No testing has been done by the utility.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Utility S has updated and replaced equipment not found to be Y2K compliant. Windowing techniques have been introduced for Unix based systems.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

The Y2K coordinator has initiated many customer contact programs including:
- Half hour program on cable access
- Presentation and response to customer inquiries
- Y2K fliers

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility S relies on vendors to provide information on upgrades and Y2K fixes. Will require all future bids and subsequent contracts to be Y2K compliant.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Contingency for the utility is driven by business criticality. The utility will have personnel at substations during key Y2K dates to facilitate manual operation if device or SCADA fails. It will have a direct line to police and fire for dispatching.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility's remaining efforts focus on training staff, customer awareness, contingency planning and mission critical device testing.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Thorough documentation for non-electric system readiness and contingency. Electric distribution planning documentation limited to reader statements, inventory and remediation work. Testing documentation and results will be added as completed.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No testing completed.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- N/A

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Distribution Manager
- Feels company's computer system is 99% Y2K ready. Relies heavily on the Operation Engineer's expertise about distribution systems.

5.2 Interview #2 –

Name: _____   Title: <u>Customer Service Manager</u>

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- The main concern for the utility administrator is the social element that may deliberately disrupt distribution. This feeling is due to the social make-up of the population. Additional fears are related to power supply.

6. List of Key People Participating in the Assessment

6.1 Utility people

Organization Visited: Utility T

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   All Y2K mission critical equipment is ready
ii)   Critical suppliers have been contacted for their Y2K readiness and contingency plan prepared that covers credible events for which a contingency plan can be prepared
iii)   Communication with power provider available via utility owned radio system if public phone system were to fail
iv)   Appropriate resources devoted to Y2K readiness
v)   Y2K program managed by "company" officer

2. Profile of Utility

2.1 General statistical information

Utility Type:	Cooperative
Annual Gross Revenue:	$17M
Control Area	
System peak Load:	54MW (summer)
Load Characteristics:	
No. of Residential Customers	14,500
No. of Commercial Customers	41
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	13

Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility T obtains its power from the transmission service provider and power marketer. The generating company has several transmission company members one of which is a transmission company that delivers the power to Utility T.

- The generating company generates from hydro, coal and combined cycle turbine power plants[1].
- The transmission company owns a portion of a nearby power plant but has signed over the power to the generating company. Physically, this plant is providing most of the power to Utility T when operating.
- A hydro plant is part of the integrated transmission system feeding Utility T. This plant is located close to Utility T.
- Utility T's load is predominantly residential but some food industry and some small industrial plants are located in Utility T's service territory.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The General Manager attended a transmission company meeting in January 1998. He initiated the Y2K project at Utility T in February 1998. The plan was drafted and adopted by Utility T's management in February 1998.
- The Board approved the plan in April 1998.
- No special line item for Y2K except that all capital outlays for remediation of Y2K problems have been approved as a part of the capital budget. The replacement of the financial accounting system required an outlay of about $200k in 1998.
- The Y2K team is headed by the General Manager with five other department managers as members of the team.

(Role of outside consultants, auditors and their roles)

- No outside consultants have been used. An audit of the Y2K program was made at Utility T's request by the transmission company.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Brainstorming was used but all processes were analyzed to zero in on the relevant inventory. The only installed equipment[2] that might have any impact on the operation of the power system, are some electronically controlled reclosers.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Vendor information has been used to assess Y2K compliance of inventory but, in addition, the reclosers have been tested (verbal statement) for year 1999-2000 rollover.

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[1] The Generating Company is considering having a plant operating in an islanded mode to provide black start capability if needed.

[2] The utility has some recording meters but these are not mission critical devices.

- Cash disbursement records were used to identify suppliers.

3.3 Test strategy and procedures

- Testing has been used for assessment of business critical as well as power system critical systems.

- The power system mission critical reclosers were tested for Y2K rollover[3]. However, no test procedure was written for this, nor were the results documented except for pass and fail notes in the assessment records[4].
- The Transmission Company did a Y2K audit at Utility T's request but concentrated on the business critical systems and not the electric power systems.

3.4 Remediation strategy

- Replace systems that cannot be readily fixed.

3.5 Customer information and survey responses

Load Type	% of system peak load or MW
Food production plant	900 kW
Communication facility	400 kW
Asphalt Plant	300 kW
Other food production plants	

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

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[3] Leap year was not tested but vendor Y2K readiness document was received indicating that the equipment is Y2K ready.

[4] A repeat test was run to show what the minimum test dates should have been and also the test procedure was discussed. The equipment passed the test for both Year 2000 and leap year tests.

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Power Transmission Company audit (see 3.1 above).

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system –overloads etc.)

- Utility T has been through a storm in January 1999 and another storm in March 1999, when several feet of snow fell, melted in a couple of days and caused trees to fall over and disrupt service. Thus, the utility has had recent actual experience with system restoration from severe disasters. Utility T relies on the training and experience of the people to manage disasters and has no detailed plan for Y2K disaster management.
- Staffing plan for New Year's Eve 1999 is ready.
- Cross training of people has been accomplished so that if any one individual in the management team is out of commission, someone else can take over the duties of the mission individual.
- Review session (round table walk-through of plan) is planned for 9/9/99 as a way to prepare staff for the 12/31/99 to 1/1/00 duties.
- Communication system for use in case phone system fails is available. Radio link can be used reach the power transmission company frequencies can be shared. This will last for 12 hours at which time the batteries for some transmitters are expected to be used up.
- System restoration will be handled by the power transmission company with support from Utility T.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility was Y2K ready on 4/15/99.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Documents were collected. Except for detailed test procedures, the documentation appears to be complete and up to date.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information

or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- The results of the assessments (testing or vendor information) are in the Y2K binder but the test procedures were not written or not inserted in the book[5].

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- There was only one type of equipment with any embedded chip and no computer control equipment for operation of the power system[6]. The recloser[7] was tested and passed the test.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Systems Engineer

- No special concerns were expressed.

5.2 Interview #2 – *name and title of person interviewed*

Manager of Marketing

- This interviewee feels there is a risk for vandalism but has no other concerns.

6. List of Key People Participating in the Assessment

6.1 Utility people
- CEO
- Systems Engineer
- Manager of Marketing

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[5] This had no impact on the readiness of the utility from the point of view of system reliability but could be a detail limiting the reliability of the business system readiness statements.

[6] Utility T has access to the power transmission company web-page giving status of the power feeding the receiving stations. This is for information only and is not needed for operation of the power system. The master station is located and owned by the power transmission company and is therefore not a part of this review.

[7] This recloser equipment is encountered in almost all of the utilities.

Organization Visited: Utility U

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

     i)   Utility U's Y2K program benefited from early acceptance and understanding of potential issues to their system (Feb. 1998).

     ii)   Utility U's Y2K Team includes members from all facets of the utility enhancing the program's depth.

     iii)   Upper level management support of the program facilitated actions and necessary budgetary requirements.

     iv)   Thorough inventory and assessment by external consultants provided early awareness of potential Y2K issues and reduced staff costs associated with these actions.

     v)   Y2K contingency planning identifies procedures to provide power in the event of local or national problems.

     vi)   Attending seminars has provided staff with a good understanding of methodology and procedures for Y2K readiness activities.

     vii)   Utility U has informed its customers and staff on issues relating to Y2K, reducing potential apprehension through increased awareness.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue (Year):	30.65 M (retail) / 4.89 M (wholesale) 1997
Control Area	
System Peak Load:	87 MW
Load Characteristics:	
No. of Customers	13,798
No. of Residential Customers	11,850
No. of Commercial Customers	1,937
No. of Industrial Customers	10
No. of Other Customers	1 (street lighting)
Number of Substations:	4

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- 52 days worth of fuel oil for generation plant (240,000 barrels).
- Survey hospitals – mandated to have back up generation; could provide for town

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Utility U's Y2K program began in February 1998.
- The General Manager is on the Board of the APPA. When he heard about the need to prepare for the Year 2000, he started an in-house committee.

(Role of outside consultants, auditors and their roles)

- A consulting agency provided Utility U with the methodology and software products to develop a comprehensive inventory to assess the compliance status of all microprocessor based hardware and associated software within the following Utility U facilities/system:
  - Electric Generating Station
  - Transmission & Distribution Facilities
  - Telecommunications
  - Metering
  - Traffic Lights

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- The inventory of Utility U's systems was performed on either a system or location basis. For example, the inventory of generation facilities was performed on a location basis with technicians simultaneously gathering information on several systems present in a given location. This method made the inventory process more efficient since it required only one or two tours of the building as opposed to traversing a large building multiple times to gather individual data for each of the systems within the plant.
- Other systems, e.g., traffic lighting, were inventoried on a system basis, if they occupy few common areas with other Utility U systems.
- It should be noted that all hardware and software items that were inspected during the inventory might not subsequently appear as inventory items. Those hardware/software items that were not considered to pose a Y2K compliance issue were not inventoried. Those hardware/software items that were considered to pose either a known or potential Y2K compliance issue were inventoried. In the case of uncertainty, the inventory team inventoried the item. Primarily, the inventory team looked for all software items and those

hardware items that included a microprocessor, E-PROM, or real time clock.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Upon completion of the inventory, data entry and QA/QC, the Project Manager printed a list of the inventoried items for the client to review. The client selected which items from this list are to be submitted for evaluation against a proprietary database. The Project Manager also met with the client to determine the priority of submission items selected from the inventory.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Electric power supplier
- Gas supplier

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- The DCS software of the Station was tested because of the important role that the Station generation has in Contingency Plans.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Replace – meters (JEM 1), Quad 4, DCS software
- Work-around – SCADA
- Replaced JEM 1 meters with Quad 4s
- Replaced DCS software at the Station to attain Y2K readiness
- Work-around for ILEU SCADA, PC requires manual rollover to next century (millennium)

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Letter to large customers detailing Y2K project activities. Utility U plans to be more proactive in communicating with vendors through additional bill stuffers, customer interaction meetings and media use.
- Responded to request for information from power pool, working on NERC requests (surveys).
- Hospitals have been visited regarding Y2K and all have back up generation as required by law.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Planning on September 9th drill. Proprietary software provides the ability to track the compliance status of inventory items throughout the year.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- September 9 drill will test the procedures.
- All employees have been informed of contingency plans
- Substations are manually controlled

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Budget is on schedule
- Upgrade meters and billing system
- Completion of readiness planning

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Budget information and supplier surveys were available for review.
- Inventory database

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Testing procedures and results were lacking.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Testing of Wonderware DCS System at Station.
    - Controls MW output. Triconex. Tri-sen TS1000 computer. The test results were the same as those reported by the utility.
    - Turboview upgraded to Wonderware running under Windows. Historical database function was not compliant on Turboview.
    - Texas Microsystems PC is the hardware platform for DCS software running under Windows NT.

- ILEU SCADA software
    - While the auditors were present, a powerdown rollover test was performed on the SCADA system for the Leap Year.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Customer Svc. Supervisor & Key Account Representative

- They are satisfied with the current status of the utility's Y2K program.

5.2 Interview #2 –
Name: _____   Title: Manager of Operations

_____

_____

_____

Interview #3 –
Name: Title: Engineering Technician

- This individual is pleased with the status of the Y2K program at the utility and feels confident the utility is ready for the Year 2000 transition.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- None, they feel they are ready.

6. List of Key People Participating in the Assessment

6.1 Utility people

- General Manager (Committee Chair)
- Operations Manager
- Data Processing Supervisor
- Manager of Information Systems
- Engineering Manager
- Meter/Electrical Foreman
- Senior Mechanical Engineer
- Communications Manager
- Energy Services Manager
- Engineering Technician
- Station Manager

Organization Visited: Utility V

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

☒Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Utility V's Y2K program benefited from early acceptance and understanding of potential issues to their system (Q1 – 1998)
ii)   Thorough inventory, assessment and testing of all microprocessor-based mission critical devices
iii)   Utility V provided staff with an early understanding of Y2K issues and training
iv)   Thorough contingency planning for mission critical services including manual system operation without communications
v)   Regular updates to Board of Directors and customers highlighting what the cooperative is doing to reduce susceptibility to Y2K issues
vi)   Utility V is working with its power supplier in contingency activities and is readying itself for the NERC 9/9/99 drill
vii)   Level of program effort matched to level of automation at the cooperative

2. Profile of Utility

2.1 General statistical information

Utility Type:	Cooperative
Annual Gross Revenue (Year):	$49,957,982 (1998)
Control Area	
System Peak Load:	150 MW
Load Characteristics:	
No. of Customers	16,236
No. of Residential Customers	9,600
No. of Commercial Customers	6,400
No. of Industrial Customers	36
No. of Other Customers	200
Number of Substations:	20

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility V is experiencing rapid growth (3% per year). The cooperative's head office has 4 satellite offices. Approximately half of its load is for the City. Other major loads that Utility V serves include: 2 processing plants (22MW and 8 MW respectively) and another large industrial customer.
- Utility V serves several critical loads including: hospital (back-up generator), rest homes, and residential customers with electric dependent medical apparatus.
- Utility V utilizes a power supplier for 100% of its power.
- The area that Utility V serves is frequently hit by storms. This has given the cooperative experience in dealing with outages and system restoration. Utility V plans to respond to any Y2K issues in a manner similar to dealing with storms.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Utility V initiated its Y2K program in the 1st quarter of 1998 when they first became aware of the issues and were able to realize the potential impact to their system. The Director of Operations formed a Y2K team that reports directly to the General Manager and the Board of Directors. The team includes Utility V's Network Administrator, and the Director of Member Services. The team's initial tasks were to assess the potential impact of Y2K issues and provide staff education and training. Their activities later extended to readiness planning, contingency planning and customer awareness activities.

(Role of outside consultants, auditors and their roles)

- Utility V relied on internal personnel to complete their readiness planning, contingency planning was delayed until mid 1999 due to power supplier contingency not being available.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Utility V Y2K team identified inventory items by walking through facilities counting and noting all critical business and mission equipment and software. Additionally the Y2K team met with departments within the cooperative to review the inventory identified during the walk through process.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- From the inventory process, Utility V identified hardware and software critical to business and operations that needed assessment for Y2K issues (software and microprocessor based equipment). Utility V contacted device and software vendors by telephone, web and "in person" to identify Y2K status. Additionally Utility V tested all testable business and operation critical devices.

- Utility V considers any device/software as mission critical if due to it ceasing to operate it would not be able to provide power, billing or payroll services.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Utility V identified its critical suppliers as those who need to be contacted in an outage situation as providers of communications. These suppliers were contacted and requested to provide their Y2K status.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility V tested all of its business and mission critical software/hardware. They are awaiting an upgrade to their billing software and plans to test it when installation is complete (8/99) and at the user's meeting. Utility V tested dates through March 2001 using power on and power off during rollovers. Testing was completed both in the office and at device location on system.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units;)

- Items identified as having potential Y2K problems were upgraded or replaced. The cooperative does not have a specific budget for Y2K and items replaced through normal attrition. Items upgraded include computers and the billing system.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility V provides responses to requests for information from customers in the form of a standard letter (sample in file). This letter has been acceptable to all that have requested information from the cooperative. Utility V has provided several updates to the community

through public meetings and has produced a multimedia presentation for its customers. Presentations have also been made to businesses requesting further information.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility V relies on vendors to update it if Y2K status changes on a device. They maintain close contact with all suppliers of critical devices.
- The Y2K plans are not externally reviewed; however, they have been reviewed by the Cooperative Manager.
- Utility V plans to participate in the NERC 9/9/99 drill to identify any issues in its readiness or contingency plan.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility V's contingency plan covers power supplier, staffing for key dates, communications, emergency procedures, plan drill, public awareness procedures, community awareness procedures and its presentation.
- Utility V will participate in the NERC 9/9/99 drill to test its plan procedures.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility V has completed its readiness planning with the exception of the billing system upgrade. Remaining Y2K activities at the cooperative include installation and testing of billing system upgrade, customer awareness activity, contingency planning updates and additions, as well as participation in the NERC 9/9/99 drill.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

Materials Reviewed:
- Y2K Readiness Plan (including updates)
- Y2K Contingency Plan
- Inventory and Testing Methodology/Results

Responses to requests for information from regulatory bodies were also reviewed.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Test procedures for Utility V are identified in their readiness plan. Test results documentation was not available in some cases; however, interviews confirmed items tested.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Two devices were retested: Cooper Form 4C and Siemens MJx. Results of the test were the same as the last time the utility did the test.

- **Note**: A different laptop was used for 4C testing than the original test. The laptop had DOS version of CCI 50. February 29, 2000 was not acceptable. This date was entered via control panel for the testing.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Network Administrator

- Is happy with the Y2K status of the cooperative. Interviewee's only concern is that Utility V depends on a power supplier for its power.

5.2 Interview #2 –

Name: Title: Secretary

- Has no concerns regarding Y2K issues. Interviewee has full confidence in the Y2K Program Manager, gained from attending internal training and information meetings.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

6. List of Key People Participating in the Assessment

6.1 Utility people

- Director of Operations

Organization Visited: Utility W

1. **Year 2000 Readiness**

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

 i)   Utility W's Y2K program has full support from upper management.
 ii)   Utility W's Y2K team is adequately staffed.
 iii)   Utility W is working closely with NPPD to achieve and maintain Y2K readiness.
 iv)   Utility W is maintaining good public communications regarding Y2K readiness.
 v)   Utility W's Contingency Plans are well developed:
   - Communication Contingency
   - Emergency services coordination
   Black start plans/critical load pick up
 vi)   Inventory form facilitated good tracking and project management.
 vii)   Y2K efforts began early enough to meet internal and industry wide target deadlines.

2. **Profile of Utility**

2.1 General statistical information

Utility Type:	Muni
Annual Gross Revenue (Year):	$42,198,715
Control Area	
System peak Load:	230 MW
Load Characteristics:	
No. of Customers	17,292
No. of Residential Customers	13,717
No. of Commercial Customers	2,771
No. of Industrial Customers	33

No. of Other Customers	767
Number of Substations:	10 transmission, 38 distribution

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- 11 intertie points
- 2 Hydro plants
- No black start capability

If water canal is frozen over, Utility W can run the two hydro plants. If the canal is full of slush, Utility W cannot run hydro plants. Because of this vulnerability, Utility W can not count on the hydro plants for black start capability in their contingency plans.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Y2K program began in June 1998.
- Initiative was another utility's Y2K program.
- No budget was specifically allocated for Y2K.
- There are two key Program Managers on the electrical side, and one Program Manager on the business side.

(Role of outside consultants, auditors and their roles)

- None

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

Knowledge of system and walk-throughs included only those devices that were microprocessor based. A device was determined to be critical if it could cause an outage.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Performed some sample testing.
- Relied on vendor statements as well.
- Testing was with reduced date set.
- Testing was used as a means of assessment in some cases.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

Common sense was used to determine critical suppliers:
- Power
- Water
- Natural Gas
- Phone Services

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- All testable mission critical devices were tested. Testing involved only 12/31/99-1/1/00 rollover.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Testing was performed as a means of assessment. Testing only involved the 12/31/99-1/1/00 rollover. As a result of the DOE review, testing will be expanded to include Leap Year dates.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- No mission critical devices required remediation. Stated policy in readiness plan is to replace all non –compliant equipment and software.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility W has used the local newspaper to communicate with its customers and will use local radio for further public relations as part of its Y2K program.

- Utility W has been in contact with local water and phone emergency management, police and fire departments, Red Cross, the hospital and area supermarkets.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Load management systems specified to be Y2K compliant.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility W must plan for 2 types of outages: localized outages and blackout of the national grid. In localized outages, restoration of service is affected by a switchman bypassing the device that is giving the problem and is immediate. Outages should be limited to 5 or 10 minutes. In the case of a blackout of the national grid, it will take their power supplier from 24 to 48 hours to fully restore power to its system from a black start condition.

- Under the direction of a City Administrator, the various agencies have held several meetings to identify the problems associated with no electricity and discuss emergency measures to be taken. Participants include Gas Company, local telephone company, Community Hospital, Civil Defense, Police and Fire Departments. The city has selected several sites for emergency use and it is the District's responsibility to see that these locations receive power first.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility W is in Phase 3 of its Y2K Readiness Plan. This involves developing publicity of Utility W's Y2K readiness and contingency plans and staff assignments for December 31, 1999.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Readiness Plan
- Contingency Plan
- Inventory/Assessment/Testing Table

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No test records.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- The selection was determined by which devices were testable and could be bypassed so as not to possibly disturb the system.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Manager of Operations
- A key concern is the power suppliers being able to stay on-line. Hopes they will not be brought down by an area wide black out.

5.2 Interview #2 –

Name: _____   Title: Chief Accountant
Is satisfied with the current status of the Y2K program and feels confident Utility W will be ready for the Year 2000 transition. Interviewee also feels confident of vendor assurances of Y2K compliance. At this point, interviewee does not see the need to go out and "buy groceries".

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- Continued power supply from Power Supplier.

6. List of Key People Participating in the Assessment

6.1 Utility people

Organization Visited: Utility X

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Complete inventory, testing, and remediation of all mission critical systems.
ii)   Very few mission-critical, date-dependent devices in the power system, all verified Y2K ready
iii)   Strong commitment to meeting Y2K readiness
iv)   No generation capability; dependent on suppliers
v)   Suggest that Y2K contingency plans be written down and expanded, especially in telecommunications area.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Cooperative
Annual Gross Revenue:	$28.2 Million
Control Area	
System peak Load:	157 MW Non-coincident
Load Characteristics:	
No. of Residential Customers	18213
No. of Commercial Customers	1837
No. of Industrial Customers	11
No. of Other Customers	1527 irrigation, 114 other
Number of Substations	23

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Their service territory is roughly a rectangle of 60 by 100 miles. They only serve the rural parts of the area. The towns are served separately.
- They purchase generation from the regional G&T, who in turn purchases transmission service from a major IOU. They own 11 of their 23 115 KV substations. At other delivery points they own equipment within the IOU's substations. They maintain their own substations and contract with the IOU to maintain their equipment in the IOU's substations.
- The IOU provides control area service. There is no RTU within the cooperative's substations, although the G&T has a SCADA for remote meter reading at the delivery points.
- Five of their substations have peaks that occur between 3 AM and 5 AM in the summer due to catfish pond aeration. They have over 1000 catfish farms, which collectively represent their largest load (about 30 MW of the non-coincident peak). This load will not be active at Y2K rollover because catfish are dormant in the winter. Reliability for this load is extremely critical because the ponds are stocked heavily. In general, the cooperative is sensitive to the issue of major outages at night.
- Another major load (10 MW) is an oil company pumping station. The station has a dedicated substation running an 80% load factor. The pumping station is interruptable for loads over 5 MW for a maximum of 3 to 4 hours. They have had this arrangement for 2 years and have exercised the load interruption 25 to 30 times during that period. Other significant loads include:

  - An animal feed mill (3.5 MW)
  - A furniture manufacturer (600 KW)
  - About 20 small industries
  - Irrigation pumping
  - Irrigation pumping for row crops (significant but variable)
- The cooperative operates in 13 counties and has four district offices, including the headquarters, which also serves as a district office. Governance is by a board elected by the membership. The General Manager reports to the board on Y2K monthly as needed.
- There is no separate Y2K budget.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

(Role of outside consultants, auditors and their roles)
- The Y2K effort at the cooperative started in February 1998 with the first iteration of the cooperative's Y2K plan. The issue had been previously discussed at the staff level as Y2K began to become a general issue and a decision was made to initiate the effort.

- The Data Processing Manager is in charge of the effort, supported by personnel from engineering and operations, including:
  - The Chief Engineer, who is also Director of Operations and Board Secretary.
  - Two engineers

- All of their software except for the meter-reading system was written in-house, including an outage response system separate from the billing system.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

(Assessment strategy/ testing- relied on vendor information sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- The code was inventoried alphabetically by library and the power system equipment by personal knowledge. Everything was assumed mission critical. The code was assessed by inspection on a line-by-line basis. Most of the power system equipment is electromechanical.

- There are a few pieces of microprocessor equipment, Schweitzer differential/overcurrent and dual overcurrent relays protecting one substation transformer, and a GE overcurrent/recloser combination relay in another unit that controls a feeder breaker. The manufacturers were called, asked about their products and letters were requested. Schweitzer sent paperwork, including a copy of a General Motors test plan they had used for testing the relays. For the GE relay, Engineer B had occasion to ask a GE representative who responded that the relay was compliant. No testing was performed. The only date dependency at the relay is data logging, which is manually retrieved.

- There is also a voltage regulator that is digitally controlled but not date sensitive.

- Suppliers were contacted and letters requested.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Tests were not performed on the power system equipment, but the code was remediated and tested.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Code was remediated by patching and fixing. Some DOS PCs used as terminals were not remediated because the date problems will not affect operations.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition form year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Responses have been provided to inquiries, but nothing has been yet placed in bills.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- There have been no outside audits. The engineering staff is responsible for purchasing new equipment and will require Y2K readiness of any new equipment.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- They stock spares and trade with other cooperatives. They also have letters from suppliers.
- They will have people on alert at critical times but cannot identify any "holes in the bucket". Their plan is to continue normal operations, which includes response to contingencies.
- If problems occur they call the G&T dispatch or the IOU if appropriate. The Chief Engineer provided an example where some of the IOU's transmission towers had been blown down, and in which he called the IOU directly.
- They have good internal radio. Other contingencies need to be addressed. There is no contingency documentation yet other than normal operating procedures.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility is Y2K ready in all mission critical areas. Some billing software remains to be remediated and/or tested, and the efforts will be completed by June 30.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- The major supplier is the G&T, which has a Y2K brochure that was reviewed. Other letters were reviewed.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Test records for the software were reviewed and consisted of test runs for transactions in Y2K and crossing the date boundary.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- No retests were observed.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

- Engineer B was interviewed. He performed parts of the effort for the power system equipment and the relevant information from the interview is incorporated where appropriate above.

5.2 Interview #2 –

6. List of Key People Participating in the Assessment

6.1 Utility people

- The Data Processing Manager
- The Chief Engineer
- Engineer B

Organization Visited: Utility Y

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 2:   Company has some issues that cause concern for meeting NERC Y2K readiness date (6/30/99), but should be Y2K ready by 12/31/99. There is a need to continue to monitor the company's progress.

The assessors reached this conclusion based on the following insights:

i)   Three systems will not complete remediation & testing until third quarter 1999. (SCADA, CEM & CIS/Utility Billing)
ii)   SCADA & CEM are vendor dependent. CIS/Utility Billing is Utility Y dependent.
iii) The risk of not completing these systems is low, and the risk of not being Y2K ready by 12/31/99 is low.
iv)   Utility Y had an early start (1996) for the Y2K project, and implemented a good strategy for Y2K inventory, assessment, remediation/replacement & testing.
v)   Good balance in use of internal, regional associations, and vendor resources to achieve & verify Y2K readiness.
vi)   Contingency plan well organized, needs work to make it "worst credible case scenario" driven. It needs contribution and coordination from operations and customer service.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	$45,000,000 1998
Control Area	
System peak Load:	123 MW winter
Load Characteristics:	
No. of Residential Customers	12,500
	12,500 for commercial, industrial and other Largest customer is 5 MW. Six of top ten
No. of Commercial Customers	are government and quasi government.
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	6

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility Y has the following generation capability: 32MW unit installed in 1963, 56 MW installed in 1974, 22 MW installed in 1988, 8.5 MW installed in 1953. Also, have two diesel units that can supply black start capability, if needed. The generation units are dual fuel. Normally keep a 10 day supply of oil to back up gas supply. They are working with their gas supplier to determine their ability to supply gas during critical Y2K periods.
- Utility Y has a very close working relationship with a Municipal Utility. There is a 138 KV line between the two, and a 138 KW line from a larger utility.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Utility Y started their Y2K project in 1996 for its IT systems through its Information Systems Steering Committee. In 1998, three subcommittees were formed, "Buildings", "Plant" and "Miscellaneous" to address Y2K issues in the rest of the company. Utility Y has spent about $800,000 on Y2K. This does not include O&M labor hours, only capital appropriations.

(Role of outside consultants, auditors and their roles)

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- They counted all electronic, business and software that may be impacted by Y2K issues. Electro mechanical devices were not included. Formal inventory lists were missing from the Buildings and Miscellaneous sections, but appear adequately documented in records kept by those groups. This needs to be added to the project documentation. They used a centralized approach with a Y2K Project Manager that reports to the Utility Manager. Primary readiness responsibility resides with the appropriate departments. Each department has a member on the central Y2K project team. Inventory items were screened and prioritized based on service criticality and reliance on a clock calendar.

- Vendor compliance information was obtained by letter campaign, self checking, other utilities and vendor web sites.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Utility Y has contacted their critical suppliers of goods and services to determine their ability to supply goods and services during critical Y2K periods. The critical suppliers are: power, gas, and communications. Have received the usual form letters from them.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility Y opted to test all mission critical systems to determine Y2K status. All mission critical systems would also be tested after remediation to ensure that they operated properly.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Utility Y used a combination of remediation strategies that included: patch and fix, upgrade and replace. They opted to patch and fix most of the IT systems with their own resources. They offered bonuses to their in-house programming staff to ensure they would remain with the company until the projects were completed.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Twenty per cent of their load is commercial industrial. Largest customer is 5 MW, which is fairly small. Most of their load is residential. Two of their larger customers have re-negotiated their contracts with Utility Y to secure lower rates.

- Utility Y sends a form letter written by the City Attorney in response to customer Y2K inquiries.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- There have been no internal or external audits of Utility Y's Y2K program. Utility Y works closely with other utilities on all of its Y2K power and testing issues. It was recommended by the Review Team that Utility Y take part in the upcoming 9/9/99 drill.

- The plan is to freeze all systems in September to ensure that Y2K readiness is maintained. Procedures for this still need to be created.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility Y is presently working on their Contingency Plan. They hope to have it approved by the Board of Directors in the August timeframe. The existing draft of the Contingency Plan requires a considerable amount of additional work. The Review Team discussed the shortfalls of the draft with the appropriate personnel at Utility Y. The Y2K Readiness Strategies Checklist contains details on what is included in the present plan and what needs to be added to it.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility Y plans to be Y2K ready by 9/30/99 after completion of remediation and testing of the remaining three systems. They will freeze their system at that time.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- The master Y2K documentation folder did not have the available Y2K documentation. This included up to date inventories, assessment and testing information from the three subcommittees.

- This needs to be included in the master documentation folder as soon as possible. There was not a standard set of guidelines for documenting Y2K issues. There was a disparity between the different subcommittees on the quality of the documentation.

4.2 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- All mission critical systems were tested. Another utility took responsibility for testing electronic relays in the 138 KV tie line. Relays tested OK. All remediated systems will be tested before being restored to service. The testing was done with power on during date rollover. Dates tested were 1/1/00 rollover and 2/29/00 rollover. Test results were based on observation of the devices/software displays.

- Retest of selected equipment/systems

- The following two systems were retested: IVR Trouble Call system and the ACS SCADA system.

- Both of the retests were done with power on and power off for 1/1/00 and 2/29/00 rollovers.

- Both systems passed all tests.

4.3 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- None necessary

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Electric Operations Interviewees
- All are satisfied with the present status of the Y2K program. They believe that Utility Y will be Y2K ready by the end of September. Biggest concerns are communications supplier, gas supplier and public panic.

5.2 Interview #2 – *name and title of person interviewed*

Customer Service
- All are satisfied with the present status of the Y2K program. They believe that Utility Y will be Y2K ready by the end of September. The biggest concerns are panic and external suppliers.

6. List of Key People Participating in the Assessment

6.1 Utility people

- Y2K Project Manage

Organization Visited: Utility Z

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Complete and extensively documented inventory, assessment, and remediation
ii)   Strong commitment to addressing Y2K issues and participating in relevant activities and drills
iii)   Not self-sufficient in generation; fully dependent on suppliers
iv)   Detailed, documented contingency plan for Y2K outage response
v)   Minimal date-dependent power system field equipment
vi)   G&T tested and documented readiness of G&T-supplied SCADA system from commercial vendor

2. Profile of Utility

2.1 General statistical information

Utility Type:	Cooperative
Annual Gross Revenue:	$33 Million
Control Area	
System peak Load:	100 MW seasonality of overall peaking depends on winter weather. Some substations peak summer, others peak winter. Relative balance depends on temperatures.
Load Characteristics:	
No. of Residential Customers	23500
No. of Commercial Customers	1500 Commercial/Industrial
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	17 plus 3 metered poletop interconnections with one of the IOUs at distribution voltage.

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- The cooperative operates in 6 counties and serves only the parts of those counties outside cities/towns and major transportation corridors. The cooperative's customer base is growing at roughly 4% annually.
- Transmission service is supplied by the two IOUs under contract with the G&T, which generally participates in all negotiations/relationships between cooperatives and IOUs in the state. Power suppliers to the G&T include several IOUs and the regional power administration.
- The only identifiable major load is a pumping station at 2600 KW with 30-40% load factor, subject to use at any time. Load control is voluntary (they get charged for demand only if they are operating during the monthly peak). Other loads are schools and a local industry. The utility now serves essentially bedroom communities to a growing technology and manufacturing area.
- If there is an issue they call the relevant IOU dispatch directly. One of the IOUs has a "wholesale customer service restoration hotline" and a wallet card with important numbers. The Engineering Manager has heard about the power suppliers' reluctance to share operational information, but hasn't experienced it.
- The utility has considerably more automation than many other utilities visited. They have a Valmet SCADA supplied by the G&T principally for load management but also usable for other SCADA functions. All of the G&T member utilities have the system, and most have activated the SCADA for non-load-management functions.
- They also have two automated systems that together support outage response. Both systems have copies of the customer database downloaded from the mainframe. When a customer outage occurs the customer calls an 800 number. One of the systems receives the call and (using caller ID and an interactive response system) looks up the customer record. The outage data is communicated to the other system that analyzes the outage (based on a connection model of the distribution system) and identifies the likely equipment failure. The second system can also take manual input from the call center.
- The utility has an employee incentive program to provide rapid outage response and minimize outages. The automated systems assist in meeting the goals of the incentive program.
- All but 3 relay types are electromechanical. Only 20 out of 58 panels are microprocessor controlled.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

(Role of outside consultants, auditors and their roles)

- Y2K effort started when the Engineering Manager read articles about Y2K and began informally discussing it with his staff and the GM. The GM asked for a formal effort. The

effort started in summer 1998. At about the same time the state Public Service Commission sent out a Y2K survey. The utility filed its first survey response in September 1998.

- The utility has participated in various information-sharing activities with the G&T, some IOUs, and others. Observed note in materials asking for comments on Pete Daly draft of NRECA Y2K guide. The G&T is also an EPRI member.

- The effort is organized with the Chief Financial Officer (CFO), as Y2K coordinator. He also took charge of the administrative and financial systems, including the telephone system. Engineering took charge of the power system, including the outage response system. Except for the G&T and vendor efforts, all staffing was in-house.

- Planning, vendor and customer letters, reports to the state PSC, and other materials are kept by the CFO in a central repository of four thick notebooks, two for the utility and two containing copies of materials from the G&T. The materials are well organized and indexed.

- Budgeting for Y2K was out of current operations, and using upgrades planned for other purposes.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

(Assessment strategy/ testing- relied on vendor information sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Inventory was done for the power system equipment informally by personal knowledge. Mission criticality was defined as use of date or time in calculations. (This excludes pure time-stamping.)
- The overall assessment strategy was to obtain compliance information. All vendors and suppliers were contacted. In keeping with this strategy, the power system field equipment was assessed by vendor letters.

- The SCADA Y2K readiness was managed by the G&T which tested the upgrades on one of the other member systems. The G&T provided a comprehensive test plan and report.

- One of the automated user outage handling systems was remediated by the provider, after the utility loaded a CD into a drive. The instructions on the letter transmitting the CD state "Please do not try to install this CD without our assistance". There is a letter from the provider in the file indicating that they had tested their system and found it compliant, but there were issues with the OS/2 operating system that required upgrade.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- The utility did not conduct formal testing, but there may have been some informal testing. An informal test was conducted as part of this review.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Remediation was by upgrade and replacement.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition form year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- They have included information in their member newsletter and have provided speakers to local organizations. Information in the Y2K notebooks included lists of media contacts.

]3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- All purchase orders have a Y2K compliance clause. Purchasing coordinates closely with engineering on new equipment orders.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- They have participated in contingency planning efforts of the G&T and others. They participated in the 4/9/1999 drill and plan to participate in the 9/9/1999 drill. They have an operational contingency plan for Y2K outage response that ranges through a set of contingencies up to brownout and blackout, with detailed identification of tasks by substation for each contingency and personnel assignments to substations.

- Their communications resources include telephone via PABZ, direct telephone, cell phone, and radio. The radios are not digital. The G&T is planning a "radio daisy chain" involving a simple message structure as a means of backup communications.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility is Y2K ready at this time.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Documents were sampled in the four notebooks noted above. Findings are noted in relevant discussions above.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- The SCADA test was documented by the G&T. The SCADAs were purchased as a group and all member EMCs received the remediation and the relevant documents.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- A test was run on a Cooper Kyle Form 4C Recloser control that was in the lab awaiting installation.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

The Engineering Supervisor for Quality Assurance.

- He is essentially responsible for maintenance of the SCADA, database maintenance of the outage response system, and maintenance of all operational computers and microprocesor field equipment.

- He expressed no concerns.

5.2 Interview #2 –

The Senior Engineer (Projects)

- Interviewee is supervisor of the dispatch center and the outage response system.

- Interviewee expressed no concerns.

6. List of Key People Participating in the Assessment

6.1 Utility people

- The CFO
- The Manager of Engineering
- The Chief Operating Officer
- The Engineering Supervisor for Quality Assurance
- The Senior Engineer (Projects)

Organization Visited: Utility AA

1. Year 2000 Readiness Evaluation

Select Level 1, 2 or 3 from below (delete those that do not apply)

The review resulted in the following evaluation:

Level 2: Company has some issues that cause concern for meeting NERC Y2K readiness date (6/30/99), but should be Y2K ready by 12/31/99. There is a need to continue to monitor the company's progress.

The assessors reached this conclusion based on the following insights:

i) Several major systems are in remediation/replacement and will not be complete and in operation by 6/30/99. These include: SCADA, _____ Hydro Controls, Communications Hub, SEDC Billing software, PCs and Servers, Telephone ADC/Voice mail and COBOL programs.

ii) All major remediation projects are fully incorporated into Utility AA's Year 2000 program, fully budgeted and well under way. Completion schedules seem realistic and contingency plans are formed to address any unforeseen delays.

iii) The testing program is limited and underdeveloped to verify vendor claims or uncertainties. Testing results lack documentation and repeatability.

iv) The Year 2000 program faces "crunch" time to bring elements together: assessment closure, remediation completion, testing/verification, inter-utility coordination/contingency planning and front line staff training. Strong project management will be necessary to impose deadlines and complete what remains.

v) Staff time, hiring and outside assistance are becoming scarce resources as Year 2000 approaches thus limiting Utility AA's flexibility in meeting the remaining completion schedules. Filling key management positions is important in advance of key Year 2000 dates.

vi) Utility AA's Year 2000 program has a number of strengths including:
- Database methodology used for inventory, assessment and remediation is a strong tool to track activity through remediation for all divisions.
- Utility AA generation resources form a solid basis for power supply contingencies.
- The Year 2000 program has received good institutional support and management involvement shown in weekly update meetings.
- Utility AA has provided program lead and coordination that has extended to assisting Utility AA with common key suppliers and an internal auditing function.
- The program builds on existing emergency management practices and self reliance to advance contingency planning.
- Good interdivisional communications within Utility AA adds to the breadth of preparedness.
- Major projects have been undertaken within the Year 2000 program with serious remediation and replacement without serious budget constraints. Significant progress has been made on these projects.

vii) Due to the strengths of the program, Utility AA has the capability to address the remaining issues and complete their readiness activities by December 31, 1999.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	
Control Area	
System peak Load:	152 MW Winter peaking
Load Characteristics:	
No. of Residential Customers	23,393
No. of Commercial Customers	5,775
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	19

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base is used for the generation, black start capability, types of loads served by the utility, critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility AA owns and operates 8 Gas Turbine Generators. These generators have a combined capacity of 320 MW (200% of peak load). The generation is fueled by natural gas, but 72 hours of fuel oil (alternative) is stored on site.
- Plant AA has diesel generators to provide black start capability.
- The critical loads as identified by the Utility are: hospitals (4), downtown business district, universities (2), and phone companies (3).
- The utility is connected to three other systems by interties.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Utility AA first became aware of the Y2K problem in 1995 when a system failure occurred during a six-year budget forecast. Since that time, the city has taken the lead in all of its departments Y2K activities. Utility AA formed its Y2K team in 1997. A cross-divisional committee was also formed for this project. Utility AA's Y2K project does not have a specific budget, but the Y2K team has been empowered to make upgrades and necessary changes to achieve Y2K readiness.

(Role of outside consultants, auditors and their roles)

- None

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- The inventory was performed by each division and collected in a central database. The goal was to have an all-inclusive inventory.
- The city sent out a memo defining four levels of priority (critical, high, medium, and low). The divisions then used these definitions of priority to rank the inventory.
- Criticality was determined if failure could result in death, severe financial loss or legal liability.
- High criticality was determined if failure would make job difficult for any length of time.
- Medium criticality was determined if failure would cause an inconvenience.
- Low criticality was determined if failure would have minimal impact.
- For the most part, Utility AA relied on vendor statements for the assessment of equipment, not much testing was done.

Critical Suppliers:

- Fuel for Generators
- Phone Service
- SCADA
- Communication Equipment
- Billing Software

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Testing program is limited and underdeveloped to verify vendor claims or uncertainties. Testing results lack documentation and repeatability. Most testing was performed by third parties and supervised by Utility AA personnel. Testing of the SCADA system currently being implemented was tested by a neighbor utility as part of FAT procedures.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Several major systems are in remediation/replacement and will not be complete and in operation by 6/30/99. These include: SCADA, _____ Hydro Controls, Communications Hub, SEDC Billing software, PCs and Servers, Telephone ADC/Voice mail and COBOL programs. The Y2K coordinator was empowered to make the necessary upgrades to systems to make them Y2K ready.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

The utility has communicated in the form of:
- Customer newsletter

- Employee newsletter
- Response letter
- Web Site
- MOA Year 2000 Readiness Disclosure

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- The city has played the role of auditor for Utility AA. The city performs regular reviews of the Y2K readiness activities. The utility included a Y2K compliance requirement in its purchase specification for its new SCADA system.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- The utility will be fully staffed for the millennium rollover. The utility has the ability and experience to operate the distribution system manually. Utility AA has an Emergency Response Management Plan that is updated and reviewed on an annual basis. The utility is able to generate 200% of its peak load.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility AA's Year 2000 program faces "crunch" time to bring elements together: assessment closure, remediation completion, testing/verification, inter-utility coordination/contingency planning and front line staff training. Strong project management will be necessary to impose deadlines and complete what remains.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

Documentation Reviewed:
- Remediation List
- Noncompliance List
- Emergency Response Management Plan
- City Contingency Plan
- City Y2K Project Binder
- City Y2K Project Master
- City and Working Summaries
- Department Status Reports

- MOA Year 2000 Readiness Disclosure

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Testing of the SCADA system currently being implemented was tested by a neighbor utility as part of FAT procedures. The utility had no test documentation for us to review.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

Test #1 – G.E. Gas Turbine Generator Engine Controls
- The test involved rolling over the control's clock to Jan. 1 2000 during start-up of the gas turbine. The controls continued to monitor and control the turbine after rollover. The controls were also tested for leap year.

Test #2 – Motorola Paging System
- The date was reset to June 22, 2000 and the computer rebooted. They then tested the system for functionality by activating one of their pagers.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Acting Customer Service Manager

- Key concerns are the external telephone service and public panic. This person had participated in contingency planning.

5.2 Interview #2 –   Operations Superintendent
Chief Power Dispatcher
Operations - Substations

- The SCADA system is seen as a key dependence. They have experience in working without SCADA. There is a need for the "front line" people to be involved in the contingency planning. They are confident that they will transition into the new century without problems.

6. List of Key People Participating in the Assessment

6.1 Utility people

- Operations Superintendent
- Chief Power Dispatcher
- Operations - Substations

Organization Visited: Utility AB

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 2: Company has some issues that cause concern for meeting NERC Y2K readiness date (6/30/99), but should be Y2K ready by 12/31/99. There is a need to continue to monitor the company's progress.

The assessors reached this conclusion based on the following insights:

i) SCADA system will not be fully Y2K tested by June 30 1999. Supplier of new system is obligated to provide Y2K ready system and will conduct Y2K tests in July 1999.

ii) Strong organization-wide commitment to addressing Y2K readiness.

iii) Sufficient local generation with proven black-start capability to meet expected load as the transition into year 2000.

iv) Citywide contingency plan, including the electric Utility AB's plan, has been adopted by others.

v) Contingency plan is being converted into operational procedures for the year 2000 transition.

vi) Excellent customer interface/information program.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal System
Annual Gross Revenue:	74,314k
Control Area	
System peak Load:	209MW

Load Characteristics:
No. of Residential Customers	37000
No. of Commercial Customers	3500
No. of Industrial Customers	18

No. of Other Customers	4
Number of Substations	8

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Coal fired power plant, built in the 50's and 60's, is under contract to others but is run for Utility AB's use if needed. Plants can be run on gas [1].
- Steam power plant is run by an AGC (automatic generation control) program.
- Combustion turbines can be used for black start and was used in the past for that purpose.
- Small run-of-the-river hydro plants also available.
- Utility AB relied too much on vendor assertions to determine Y2K readiness. However, this affects primarily non-mission critical systems.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The Y2K readiness work began about 4 years ago (1996) when outside software specialists were in to check MIS (management information system) programs.
- A formal program initiated in 1998 when Y2K Coordinator was appointed.
- Y2K Coordinator interfaces with Department Heads to get all functional areas ready for year 2000.
- A consulting firm was retained in 1998 to audit the Departments Y2K program.
- Insurance Company has also performed an audit of Utility AB's records to ensure Y2K readiness. However, this was not an on-site audit. The audit was actually performed by a company retained by the Insurance Company for that purpose.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Decentralizes process for taking inventory. No uniform standard for how to identify Y2K sensitive equipment. However, outside consultant provided leadership and led walk-throughs through facilities, which lends credibility to the process.
- APPA's data base information used to identify types of equipment that could be date sensitive.
- Definition for mission critical is if it can affect power delivery.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

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[1] Firm supplies of gas are not available in the winter because home heating has priority.

- Utility AB relied on supplier test data if available.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

Utility AB has been working proactively with the major suppliers.
- Suppliers [2] were identified largely through know-how by the key people involved. However, Utility AB does not use just-in-time replacement of inventory so there is a fairly large buffer inventory for all normal consumable parts.
- Utility AB has access to three different coal [3] suppliers. The coal is transported over three different railroads [4].
- Utility AB plans to have a 48 hour supply of fuel oil on hand for the CT power plant. The fuel will last longer at less than full load. Note that CT plant is normally used for peaking and black start if needed.
- Utility AB is working closely with its power supplier, which expects to be ready with its EMS system upgrade in August 1999.
- Utility AB has transmission ties to two other utilities.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Assessments relied predominantly on vendor information. However Utility AB performed some testing although this involved non-mission critical equipment.
- Non-compliant, mission critical systems are being replaced.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Embedded chip type systems were tested with 12/31/99-date rollover. SCADA for more complex systems, in addition 2/29 and end of 2000 date rollovers were included.
- APPA's, IEEE's and BNS standards have been used to evaluate if vendor compliance testing [5] has been adequate.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

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[2] Records covering vendor contacts were distributed throughout the organization. Central tracking and repository for correspondence would have been desirable for good overview of the status of the various inquiries. The informal identification of vendors also leaves some to people's judgement. However, the basis for the selection appears sound based on interview information.
[3] No coal is typically purchased in the cold months (December through February). Supply on hand in November is typically enough for 30 to 40 days at full load but at normal load is expected to last through March.
[4] If all utilities increase stockpiles of fuel, coal production capacity may be a limitation and railroad car stock may be stretched thin.
[5] Digital relays have been tested extensively and the test results were made available to Utility AB. These tests were more extensive than what Utility AB would have been able to do by itself.

- SCADA system is being replaced
- CT controller, although year-2000 ready is being replaced because it is too old and no longer maintainable.
- CEM system will be replaced with a new unit.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility AB is a part of the City's Y2K program. Presentations have been made to a number of civic groups. Also, Utility AB's web site has reduced the number of inquires about Y2K problems dramatically. Regular meetings have been help with the major customers for the last 6 months.

Load Type	% of system peak load or MW
Hospital	7 to 15% depending on amount of self-generation
Electronic manufacturer	22 MW

- The City's Y2K manager gets information, which is forwarded to the City Council. This keeps the community informed.
- Inquires are logged but responses are not tracked.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Outside Consultant has been auditing the Utility AB Department's progress on Y2K readiness.

3.7   Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Bad weather caused a blackout of the City and the surrounding area a few years ago. Utility AB went through a complete black start sequence to restore power to the City. Thus, Utility AB's procedures for black start and system restoration have been proven to work.
- The contingency plan[6] anticipates at worst, an outage of a few hours duration before it can have power back using its own plants.
- Within 4 hours after a loss of its power supply, Utility AB can bring up to 143 MW on line. The projected load for January 1, 2000 is about 110 MW.
- Assuming full power operation[7], Utility AB has a 30 to 40 day supply of coal[8] and a 48-hour supply of oil for the CT units.

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[6] The City's contingency plan has been adopted as the model plan by others.
[7] The CT units can not be resupplied with oil fast enough to maintain this power level continuously. Utility AB realized that it may need to do more since it does not have a consistent oil provider. More may need to be done to find out the availability of fuel late in the year.

- The plan does address curtailments in case of power shortages and the existing (not available for review) curtailment procedures have to be updated.
- Utility AB can operate the system manually if the SCADA system or the leased phone lines for the control of the system fail.
- The plan assumes that critical suppliers will be able to deliver goods and services within 30 days or less after the transition into Year 2000.
- The plan assumes that phone services will be disrupted and that communication within Utility AB and with the key power suppliers will be by means of radio or satellite radio. [9]
- Phone service as required for the customers to contact Utility AB was not included in the plan but will be addressed with the phone company. Also, Utility AB has a backup phone system if its own phone system were to fail.
- Extra staffing on New Years Eve is planned but details are yet to be documented.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility AB has no budget[10] limitations hampering its Y2K readiness.
- Utility AB participated in the April 9th exercise.
- Utility AB has old style (non-digital) controls for distribution system (reclosures and shunt capacitor bank controls) and is using manually operated sectionalizing switches. Thus, there should be no disruptions of the distribution system.
- Utility AB is using some digital relays for the transmission system protection. These are backup relays and not the primary ones but leased lines are used for communication with these relays. Thus hackers should not be able to get into the relays and change settings.
- The VHF communication MSAT, mobile satellite, needs to be installed and tested to allow Utility AB to contact one of the power providers during emergency situations.
- Replacement is used where mission critical systems have been found to be non-compliant.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- A lot of the documentation was distributed among the groups doing the work. This made a review of the documentation difficult. Sample documents were requested and used for the readiness determination.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

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[8] Resupplying coal in the winter will be difficult because the arriving coal will be frozen and difficult to unload from the railcars. Follow up conversations with coal providers on the accessibility of reserves was discussed.
[9] Utility AB intends to participate in the 9/9/99 test although this was not included in the written plan.
[10] A lot of the expenditures for Y2K readiness has come out of the regular budget and has not been given a separate line in the budget.

Utility AB relied too heavily on vendor compliance letters but the following alleviated the situation:

- Although it ha relied on vendor information for determining if a piece of equipment is Y2K ready[11], it has made the assessments with careful consideration to the criticality of the equipment under assessment.
- Mission critical equipment was in the process of being replaced and test procedures for verification of Y2K readiness were still being developed. Thus, the testing philosophy was verified using non-critical equipment. However, for non-critical equipment, the test procedures were not well documented and test results were not saved. Based on the general emphasis on Y2K readiness, it was concluded that the critical equipment would be thoroughly tested[12].

4.4   Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- The test selected was of a laptop used for programming RTUs. The laptop has software for testing of the special RTU protocol but this software had not yet been used at the time of the test.
- The laptop was selected because other tests were not feasible in the timeframe of the review. Alternatives considered were relays and the load management system. The relays would have required a test clearance, which would have taken too much time. The load management system had just been tested.
- The laptop was a Micron Transport ABDE, a 150 MHz Pentium running Windows 95 and NT. The test consisted of running Test 2000 by Rightime. The test program covered only the platform (hardware plus operating system). The test program set various times, determined the results, and produced a pass/fail report. The test was passed. We power off rollover tests were not rerun.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Director of Power Systems Operations and a Network Systems Analyst representing the Power Supplier

- No real concern but if anything is critical, it is the fuel supply chain.

5.2 Interview #2 – *name and title of person interviewed*

Manager, System Operations

- No special concerns.

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[11] Some equipment, such as steam temperature controls, boiler controls and air flow controls, is not testable because there is no date entry feature so for these systems vendor assurances is the only information available.

[12] SCADA system needs to pass Y2K tests. Utility AB intends to make sure Y2K in-house testing is done on the SCADA system once the Vendor sends the testing procedures. Also, the new computer system to replace the old gas turbine needs to be tested after installation.

5.3 Interview #3 – *name and title of person interviewed*

Two Members of the Power Production Department
- Unloading of coal if needed during the winter will be difficult.
- Competition for coal could delay shipments this fall if all utilities add extra fuel to ride through Y2K.

5.4 Interview #4 - *name and title of person interviewed*

Manager of Engineering, the Supervisor of Technical Services and other staff members of the engineering team.

- No major concerns.

5.5 Interview #5 – *name and title of person interviewed*

Manager of Marketing and External Services

- Concern about overdoing it and creating fears where none exists.

5.6 Interview #6 – *name and title of person interviewed*

Information Technology Systems Administrator

- No major concerns.

6. List of Key People Participating in the Assessment

6.1 Utility people

- Instrumentation, Control & results Technician
- System Operations
- Manager Information Services
- General Manager
- Information Technology Systems Administrator
- Supervisor of Technical Services
- Manager of Marketing and External Services
- Power Production
- Two Staff Members
- External Consultant
- Director of Power System Operations, Power Supplier Representative
- Network Systems Analyst, Power Supplier Representative

Organization Visited: Utility AC

1. Year 2000 Readiness

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 2:   Company has some issues that cause concern for meeting NERC Y2K readiness date (6/30/99), but should be Y2K ready by 12/31/99. There is a need to continue to monitor the company's progress.

The assessors reached this conclusion based on the following insights:

  i)   SCADA will not be remedied and tested until September 1999.
  ii)   The Y2K process is being completed but has been informally documented.
  iii) Complete inventory, complete assessment, 85% complete remediation and testing.
  iv) Contingency plan needs to be completed and documented.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Municipal
Annual Gross Revenue:	Appr. $35M
Control Area	
System peak Load:	240 MW (Summer)
Load Characteristics:	
No. of Residential Customers	32255
No. of Commercial Customers	
No. of Industrial Customers	4458
No. of Other Customers	2

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility AC has built two new stations in the last three years but has maintained its use of electromechanical components for control and protection where possible.
- The hydro-plant has not been built using digital controllers for excitation, start and shutdown sequences.

- Capacitor banks are electronically controlled but with systems that do not rely on microprocessors.
- Utility AC uses SCADA systems for control of its distribution system but has no distribution automation equipment.
- Major loads include an electronics manufacturing facility with a load of about 3 to 4 MW although a new textile plant is being built that will require about 30 MW.
- Utility AC is dependent on power from Power Supplier even though it has a small hydro plant capable of serving at most 25% of its load. This plant is not possible to have directly connected to the city's grid because the lines owned by another utility can not be easily reconnected to a radial feed of the city.
- Black start capability is available in Power Supplier's own system so Utility AC's hydro plant is not needed for this.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The City has a citywide effort to become Y2K ready involving all of the citywide functions such as police, water, sewer, fire protection and electric utility operations
- Utility AC's Y2K efforts began in November 1997 but the City began to look at its financial accounting systems as early as 1995. This system is scheduled to be replaced and will then integrate some of the functions now handled by Utility AC itself.
- The General Manager of the Electric Department is a member of the City's Y2K team.
- System Electrical Engineer is responsible for the Electric Department's Y2K effort but has assigned the Information Services/Telecommunications Engineer to the team leader role for the Department's Y2K efforts. He has two people in his staff that participates but also gets help from other Department supervisors.
- Budgets are developed from line items in the City's budget for approval by the City Council[1].
- The General Manager has bimonthly meetings with Mayor including review of Y2K readiness status.

(Role of outside consultants, auditors and their roles)

- Utility AC is a 100-person operation, which makes it fairly self-reliant. However, an outside consultant has been engaged to assist with the Y2K work.
- The only other outside involvement has been that of the City's auditors. However, the audit function has not been extended beyond the financial arena.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

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[1] The City Manager did not want to create a line item for Y2K remediation. Thus, money has been approved item by item in case replacement has been deemed to be the best remediation strategy to resolve a specific problem.

- Utility AC identified [2]only the equipment and systems that are date sensitive. [3]
- There is no date sensitive equipment in the distribution system.
- Critical equipment was loosely defined as anything that would not support the normal operation of Utility AC. That is, it includes business critical systems.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

Vendor information was used to assess Y2K compliance of components and systems.

- Written requests for information was sent to a few vendors.
- APPA's database, vendor web pages or direct meetings with the vendors was used to zero in on the compliance issues.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

Identification of critical suppliers included only the major ones such as the power supplier, phone companies etc. because a parts inventory expected to last close to three months is on hand.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Software test programs were used for PC compliance testing.
- Non-compliance of phone system and SCADA system determined by vendor testing or information.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- No other testing done because the equipment either could not be tested.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units;)

- Purchased new PCs for people with outdated hardware
- New SCADA system on order. Expected completion in September 1999.

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[2] The City sent people to school to make them understand the Y2K problems.
[3] No directive has been issued to instruct the people doing the audit how to develop the inventory. Thus, the method used by the different people involved in the inventory process is undefined. Distribution System and Substation Engineering people used a process of going through documents, drawings etc. to zero in on date sensitive equipment. Some may have been solely relying on their knowledge of the system to develop the inventory. However, the system is small so the risk of omissions is small.

- New phone system to be ordered because the old phone system is non-Y2K compliant in its messaging subsystem. Order expected in August and completion of new system installation in December 1999.[4]
- Event recorder in power plant has been sent back to the manufacturer for upgrading.
- A monitor for bearing vibration monitoring of the generators will not be fixed but the date will be set back so the non-Y2K compliance problem of this unit will not be a functional problem.
- New automatic meter reading equipment on order but not yet delivered has been specified to be Y2K compliant.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- It is expected that the Mayor will take steps to communicate with the community about Y2K readiness. However, nothing is formally planned yet[5].
- No special communication effort planned for the major customers[6].
- All responses to customer Y2K inquiries formally prepared in the City Attorney's office. The Electric department is only tracking inquiries to ensure that a response is sent out.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility AC has used no outside or inside auditors and has not participated in the April 9th NERC exercise[7].

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility AC has experienced several storms. Utility AC's management is experienced in dealing with such disasters.
- A plan for staffing of substations and SCADA system is available in draft form. However, the plan is not yet complete and other contingencies related to the transition into year 2000 needs to be developed.
- Power Supplier has control over the circuit breakers placed in the substation entrance. Thus, the Electric Department has control over restoration after a blackout unless Power Supplier requests special switching to pick up load in stages.

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[4] This is a tight schedule. However, the City's phone system is Y2K ready and can be used if the system is late. Also, an older backup phone system can be used temporarily if the new phone system is not delivered before 12/31/99. Operator on duty will be used to work around the lack of the automatic attendant function.

[5] Concerns were expressed that panics could be one result from overemphasizing concerns over Y2K issues.

[6] The Y2K Manager indicated that as a result of our review, he might initiate discussions with the major customers if the Power Supplier thought that this would be desirable.

[7] As a result of our review, the Utility AC staff became aware of the upcoming September 9th NERC exercise and may participate in this with Power Supplier.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility AC knows what work that needs to be completed even though formalism in schedules and budgets are lacking. It seems though that with exception for the new phone system, the work should be completed well before 12/31/99.
- Utility AC has meetings with Power Supplier to review progress on Y2K work but has not requested a formal Y2K compliance statement from Power Supplier [8].
- Radio system can be used for communication internally if the phone system including cellular phones is unavailable. This also includes a radio communication link to Power Supplier.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

Documentation was available although not everything was documented to allow for verification of statements made by the Y2K team[9].

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Formal test plans were lacking but since the remediation strategy was to replace equipment that was non-compliant, this deficiency does not appear to have an impact on the readiness of the Utility AC at the end of the year.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- None to retest because the equipment was being replaced or non-critical to the mission.

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[8] Such a request may be made as a consequence of this audit.
[9] Records of phone calls to vendors were not available not in all cases were copies of web page information on which the Y2K readiness was based. Thus, the documentation was with holes but in the areas critical to the Utility AC's mission, the work was progressing toward satisfactory remediation.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Manager, Customer Service

- The Customer Service Group handles calls for service after the account has been established. The output is a trouble ticket, which is forwarded to the dispatchers for handling. The forwarding uses an MS-Access database built to gather statistical data. This has been in place for about 4 months. When the new computer system for the City is in place, the group may use this system for the preparation of the trouble tickets.
- There will be staffing around the clock for service calls (one call taker and one lineman). At night there is a 2-man crew taking the calls. If a storm is forecast, the staffing will increase.
- The Manager has participated in the development of the contingency plan and has reviewed the plan. If the Electric Department's phone system fails as a result of the Y2K problem, the 911 system will be used. The emergency communication procedures have been tested in other disasters such as storms, which are quite common. However, the staffing for the upcoming New Year's eve has not been reduced to writing yet. The Manager expressed concern only about the unknowns.

5.2 Interview #2 – *name and title of person interviewed*

Manager, Distribution Systems and Substation Engineering

- The Manager has gone through his records (drawings and other documents) of the substations and distribution system to identify any potentially Y2K sensitive device or system. He has not found any piece of equipment that could have a problem in his part of the system. Therefore, there has been nothing to test either. He has also made a number of calls to vendors to check on Y2K compliance but has not documented these calls or placed a note about them in the Y2K file.
- The Manager has developed the contingency plans for the distribution system. However, the plan is still a draft and needs more work. The curtailment portion of the plan was ready for use last spring when a nuclear plant in the Power Supplier's system tripped.
- The Manager is not concerned about the Y2K transition because if anything goes wrong, he can have the system back in 45 minutes or less, assuming supply from the Power Supplier is available. Security of facilities may be a slight concern, but the Manager has gone through security training arranged for by the Electric Department.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- The security and welfare of the people is the number one priority.
- Concern about panic and sabotage was expressed by all.
- Concern about unknowns was also mentioned. However, the managers of the Electric Department were confident that they had so little equipment that could be Y2K sensitive and had manual procedures as a fallback in case the unexpected were to happen, so the risks for any problem at the transition to the New Year seemed very low.

6. List of Key People Participating in the Assessment

6.1 Utility people

- General Manager
- Engineering Manager
- Distribution Systems and Substation Engineering
- Information Services/Telecommunications
- Financial Manager for the City (final results review)
- Consultant to the Utility AC

<u>Organization Visited: Utility AD</u>

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

    i)   Low level of microprocessor-based mission critical devices.
    ii)   Vendor compliance statements for all items identified in the inventory.
    iii)   Work-arounds for cosmetic problems identified.
    iv)   Experience gained from previous outages (ice storms).
    v)   Reduced vulnerability due to dependency on power supplier.

Profile of Utility

2.1 General statistical information

Utility Type:	REC
Annual Gross Revenue (Year):	97 million
Control Area	
System peak Load:	330 MW
Load Characteristics:	
No. of Customers	93,202
No. of Residential Customers	86,205
No. of Commercial Customers	6,883
No. of Industrial Customers	~260
No. of Other Customers	
Number of Substations:	72

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility AD has no generation and relies on a power supplier to provide all of its power requirements. The utility serves mostly small loads. The largest load is approximately 8 MW.
- Utility AD has strong ties with a large utility in the area, their power supplier and recently merged with another utility.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Y2K preparation was initiated following the merger. In 1999 a consultant identified Y2K compliance issues with their billing software. Electric readiness activity began in early 1998.

(Role of outside consultants, auditors and their roles)

- A billing system consultant was hired in 1994 to upgrade the system.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Mission critical functions after rollover are okay. No ranking. Checked everything.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Bench test for relays. Input 12/31/99 and watched rollover and then checked to see if it was working correctly. No power off or other dates were checked. The utility plans further testing and documenting through September.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and

complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units;)

- No mission critical devices needed remediation. Non critical devices have been remediated through upgrade or replacement. Work-arounds are in place for cosmetic issues.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility AD has a form letter that is sent to customers requiring Y2K information. They also plan to ramp up their efforts informing customers of status through the media (newspaper, TV, radio).

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- No formal process was in place.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility AD has extensive experience of outages caused by ice storms. This knowledge and their emergency plan will be utilized to form their Y2K contingency plan.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility AD is modifying its testing methodology and documentation procedures.
- No specific Y2K budgeting.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- No test documentation had been completed. Utility AD plans to document all testing by the end of September 1999.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- 1st retest: ABB DPU 2000 Relay was tested for rollover 12/31/99 and 2/29/00. Power on and power off was tested, and the results were as expected.
- 2nd retest: Siemens MJAD was tested for rollover 12/31/99 and 2/29/00. Power on and power off was tested, and the results were as expected.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Executive Vice President
- Was confident that Utility AD was Y2K compliant. There are not that many electronics in the system to cause worry. The three delivery points are not automated. The President keeps the staff informed of Board meetings and of the Y2K program.

5.2 Interview #2 –

Name: Title: Assistant VP, Office Services
- Feels confident that Utility AD will be ready at Year 2000 transition and is very dedicated to getting everything right.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- Receiving power from power supplier.

6. List of Key People Participating in the Assessment

6.1 Utility people

Organization Visited: Utility AE

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

☒Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   All electric system mission critical devices inventoried have been tested and verified using thorough test procedures.

ii)   Utility AE's Y2K program benefited from well thought out procedures for monitoring progress that was leveraged by management at all levels.

iii)   Staggered rolling forward of generation facilities assures that if a Y2K problem exists, it will only affect one unit.

iv)   Early acceptance and understanding of Y2K issues facilitated timely project management and completion for electric system mission critical device readiness.

v)   Use of industry standard test procedures and plan methodology provided a solid base for the project.

vi)   Team members were able to stay ahead through use of EPRI program and attending Y2K information sessions.

vii)   Participation in NERC test drills identified areas of further work and planned participation in 9/9/99 drill may provide additional benefits to the project

2. Profile of Utility

2.1 General statistical information

Utility Type:	IOU
Annual Gross Revenue (Year):	$275,495,523
Control Area	
System peak Load:	1,140 MW
Load Characteristics:	
No. of Customers	
No. of Residential Customers	105,322
No. of Commercial Customers	15,024
No. of Industrial Customers	178
No. of Other Customers	23
Number of Substations:	87 distribution/26 transmission

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility AE owns and operates 6 coal-fired generation units and has 4 reserve peaking/emergency units that are gas/oil (dual fuel). The utility has procedures for black start of its generation and could act as black start to other utilities but has no contracts in place.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Electric System: Project initiated mid 1998, task force (subject matter experts) June 1999, Y2K OPS group August 1998.
- IT: Mid 96 issue identified. Database created and ready for monitoring results/testing etc. April 1998. Strategic plan in 1996 was to upgrade non-compliant equipment.

(Role of outside consultants, auditors and their roles)

- An outside consultant provided Y2K auditing services for the IT business. No auditing of the electric system was done.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Utility AE requested area coordinators to provide inventory of all microprocessor controlled devices in their area regardless of criticality or clock dependency. This was achieved through walk-through and expert department staff knowledge. Inventory items were entered into the Y2K database and reports returned to coordinators for device testing and verification of completeness. Items in the database were ranged for criticality using NERC guidelines and definitions. Items assigned probability (1,2,3) and criticality (1,3,6). Weighting = probability x criticality. All items which ranked 6 or greater were tested.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Utility AE contacted vendors to verify compliance and remediated items identified as non-compliant. All mission critical (electric system) devices went through vigorous testing (adapted GM test procedures) to assess readiness.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Utility AE contacted all critical suppliers and received letters regarding status. Contingency plans include contingency for all critical suppliers identified. Utility AE's Y2K Program Manager identified critical suppliers by e-mailing all area coordinators for a list of any suppliers that they considered critical. The Purchasing Dept. sent letters to those suppliers and monitored response. File contains list of non-respondents for further checking.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Testing based on probability and criticality. Probability of failure ranked 1, 2 or 3 while criticality ranked 1, 3 or 6 (highest).   Based on product of criticality/probability. If product was 6 or greater, the device was tested if applicable.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Utility AE adapted the GM test procedures for Y2K to their business. Extensive dates were tested both with power on and power off. Items remediated or upgraded were retested.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units;)

- All items identified for remediation were fixed, replaced or documented for workaround. If a workaround was identified, this was tagged in the database, and a reminder will be issued about the workarounds identified (by area) to the coordinator for that area at the end of the year and before the 2000 leap year.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility AE has provided regular updates on status to customers and shareholders through press releases, SEC filings and public awareness meetings. The company plans to ramp up this effort to reduce apprehension of its customers. All inquiries from customers have been responded to. Additionally, Y2K literature has been used as a bill stuffer twice.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility AE will continue to monitor Y2K events, participate in the NERC 9/9/99 drill, monitor industry magazines and receive updates through their membership of EPRI's Y2K program as quality control measures. Utility AE also requires new devices bought to be Y2K compliant but tests them to assure compliance.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Plan centered on four hours around midnight 1999-2000, however for fuel supply and critical components, it covers from one week to a few weeks.
- All relevant Regional Reliability Council concerns were addressed.
- Black start procedures for all coal fired plants were addressed and executed for a plant.
- Communication system contingencies were covered as well as satellite link to be acquired.
- Training will continue through December 1999.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility AE has completed its electrical system mission critical Y2K readiness and is working on testing of items of lower criticality and business systems compliance.
- Work is also being done on finalizing and signing-off on the contingency plan and preparation for participation in NERC's 9/9/99 drill.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- All relevant documents were identified and reviewed. The project organization and use of Oracle database provided excellent documentation.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor

information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Items identified in the inventory were assigned a testing code when testing was done that identified file location (if applicable) for test results. The test results were documented and have 3 levels of sign off before entry to database.
- Testing was performed on all electric system mission critical testable devices. Following GM test procedures and attending EPRI conferences benefited this process.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Assessors selected items for retesting from the inventory. Items were selected to coincide with other events (interviews) at area of testing.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Name: Title: Manager of Customer Service

- Was aware of Y2K plans and testing but not involved in these activities. Interviewee felt that he had received good communication on Y2K from management and was aware of suppliers' contact and was checking the status in that area. Interviewee had confidence in the team, felt there were some glitches at Y2K, but nothing of epic proportions. This person's two concerns were in customer service areas and that ITRON would not work.

5.2 Interview #2 –

Name: Title: Director of Energy Delivery - Operations

- Felt confident that Utility AE is ready for the Year 2000. Interviewee felt that the Y2K program provided side benefits such as updating the organization's Contingency Plans, which needed doing anyway. This person would have been comfortable accepting vendor statements, but Utility AE tested everything anyway. Agreed that being open to field crew comments on Contingency Plan procedures would improve the Plan and facilitate "buy in." This was evidenced in the April 9th Drill. Interviewee a cost conscientious manager and was initially skeptical about the time and effort put into the Y2K program but is more comfortable about it now. This person understands that Utility AE had to push hard to complete the project because there was a danger of the effort and attention waning otherwise.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- None identified.

6. List of Key People Participating in the Assessment

6.1 Utility people

- Y2K Area Coordinators

Organization Visited: Utility AF

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)	Strong company wide commitment to meet Y2K readiness dates.
ii)	Auditing process assures schedule & QC performance.
	Project decentralization facilitates department based knowledge use, however interpretation of accountability and documentation standards may
iii)	vary.
iv)	Need process to ensure maintenance of Y2K readiness.
v)	Project tracking & staffing provide a good overview of project progress.
	Relied on self testing, instead of vendor assertions to determine Y2k
vi)	readiness which is prudent.

2. Profile of Utility

2.1 General statistical information

Utility Type:	Investor owned
Annual Gross Revenue:	$169,563,000 electric
Control Area:	
System peak Load:	606 MW
Load Characteristics:	
No. of Residential Customers	106,709
No. of Commercial Customers	16,428
No. of Industrial Customers	75
No. of Other Customers	51

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

• Utility AF owns and operates a coal fired plant and three combustion turbines with a total capacity of 299 MW. In addition, they own 17.8% (93 Mw) of a nuclear plant operated by, and 22% (232 MW) of a coal plant. Combined with their owned and operated generation, this is sufficient for their peak needs. They have completed an agreement to sell their interest in the

- nuclear plant. Utility AF has sufficient generation to meet the expected 1/1/00 peak from their own generation.
- Utility AF has black start capabilities from their own generation facilities, and could operate in an island mode if necessary. Utility AF works closely with region on reliability issues and contingency planning. They should be in good shape for any Y2K emergencies.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The initiative for Utility AF's formal Y2K program came from the CEO. He detailed his expectations for Utility AF's Y2K program in a memorandum in 1997. Previous to this each department was on its own for Y2K. The IT group started their Y2K program in 1993 and completed review and inventory in 1996. After the CEO's memorandum, the Senior Vice President was named to head the Y2K program. Someone was named as Y2K Project Manager, with another added later to head the operational side of the project. Utility AF utilized a decentralized strategy for Y2K. Each department within the company named a department Y2K Project Manager, who was a member of the Y2K project team. Each department is responsible for Inventory, Assessment, Remediation and Testing of their equipment.

- The Y2K project team met formally every two months through the end of 1998. Have met once in 1999 and will meet at the end of June to confirm Y2K readiness, except possibly for a Continuos Emissions Monitor.
- The Y2K Project Manager submits a monthly Y2K status report to upper management. The CEO uses this report to brief the Board of Directors.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Each department determined their own strategy for Inventory and Assessment. The operations department relied on Bills of Material and walkthroughs to determine the Y2K Inventory. It was a thorough approach. Each inventory item was assigned one of three categories: C1, C2, C3 based on guidelines to determine criticality of the inventory items.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- The assessment phase required all vendors to be contacted for Y2K information regarding their products.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- All suppliers of goods and services that Utility AF deemed critical were contacted to determine their ability to supply goods and services during critical Y2K periods. No site visits of critical suppliers are planned at this time.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Vendor assertions of Y2K readiness were not relied on for Y2K readiness. Every item that was category C1 or C2 required testing to determine Y2K status. All C1 would undergo integrated testing, while C2 would undergo standalone testing.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Test procedures were based on vendor recommendations, or were developed by Utility AF.
- Utility AF's internal audit team was involved in all the C1 testing and reviewed the C2 tests.
- An external auditor was brought in to review all elements of the Y2K process.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- As with Inventory and testing, the remediation strategy was left to the departments. As long as the systems and devices were Y2K ready, the department could choose whether to fix, replace or work around a Y2K problem.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility AF is working with the County and Emergency agencies for dealing with customers. Have sent a form letter response in answer to inquiries from their customers. Are planning to become more proactive with customers now that they are Y2K ready. Most customers have stated they are not going to shut down operations over the New Year.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility AF has used internal and external auditors to great advantage. Their internal auditors are part of the project team. The internal auditors take part in all C1 testing and review C2 testing. They also review and comment on other aspects of the Y2K project. They will take a lead role in ensuring that Y2K readiness is maintained. A Y2K Change procedure Is being put in place.
- An external auditor was hired to review the Y2K process. They have been to Utility AF twice to conduct audits.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Utility AF was working on their contingency plan at the time of the on site review. Each department will develop their own contingency plan, which will be integrated into a corporate plan. The operations group is using the NERC guidelines for its contingency plan. Major contingency items include manning all 55 substations with two people during the hours between 10PM and 2AM on 12/31/99. Biggest concern of the VP Operations is sabotage/vandalism during this time. Contingency planning is to be completed in July.
- Utility AF is purchasing a satellite telephone system, as part of the NERC plan for back up communications for their control center. They are working with MAIN on this and the operational contingency plan. They have their own 24 line PBAF that can be used for customer calls if the telephone company switch is lost.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility AF will be Y2K ready by the NERC 6/30/99 date. The only item that remains open is the CEM. This would not affect their ability to operate but could result in fines from the EPA.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- The Y2K project is well documented. The biggest concern is how do you maintain standardization with each department being responsible for its Y2K efforts. The use of internal and external auditors has helped.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor

information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Utility AF has kept detailed test records for all their mission critical testing. As stated earlier, all C1 items are tested as integrated systems wherever possible. All C2 items are tested as stand alone devices. Some type testing of C2 items has been done.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- The EMS system and recloser relays were retested using the Utility AF's test procedures. All passed. See attached test write up for details.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*
(Impressions from interview; concerns and or convictions and reasons for these)

Vice President Operations
- He is very knowledgeable about the status of the Y2K project. He receives the monthly reports that the Y2K Project Manager sends to management. It is his decision to man the substations on New Years Eve. He strongly believes that Utility AF is Y2K ready. His biggest concern is sabotage/vandalism during that time.

5.2 Interview #2 – *name and title of person interviewed*

Director of Customer Service.
- Believes that Utility AF and his department are ready for the transition to the Year 2000. He thinks that the Y2K concerns are overblown. His department has a training program for Y2K that includes three training sessions (May, Oct., Nov.) He will have people on site during the Y2K transition.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- All of the people interviewed strongly believe that Utility AF is ready for Y2K. Major concerns were vandalism and failures of the transmission system that could affect Utility AF. Utility AF has sufficient generation to supply the expected load on New Years Eve.

6. List of Key People Participating in the Assessment

6.1 Utility people

- Y2K Project Manager
- Y2K Project Manager for Operational areas
- Internal Auditor

Organization Visited: Utility AG

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

    i)   Mission critical equipment has been assessed and remediated.

    ii)   Appropriate resources have been allocated for Y2K readiness and readiness efforts have management support.

    iii)   Local generation is available for loads anticipated during key Y2K dates. Local generation has dual fuel capacity.

    iv)   A Y2K dedicated team reporting directly to upper level management has been assembled.

    v)   Utility AG has proven system restoration procedures from past outages.

    vi)   Utility AG has good internal and external communication on their Y2K readiness program and Y2K issues.

    vii)   Utility AG has adequate documentation for Y2K readiness.

2. Profile of Utility

2.1 General statistical information

Utility Type:	IOU
Annual Gross Revenue (Year):	602M
Control Area	
System peak Load:	1,439MW
Load Characteristics:	
No. of Residential Customers	260,356
No. of Commercial Customers	26,396 (Small C&I)
No. of Industrial Customers	177 (Large C&I)
No. of Other Customers	3,867
Number of Substations:	144 (4 bulk power substations)

Local Y2K environment

(Include relevant information about the utility such as what fuel base is used for the generation, black start capability types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities, etc.)

- Utility owns and operates three generation plants, which provide about 800 MW of gas turbine generated electricity. One unit is used only for peaking, and provides 80 MW.
- Utility also owns small percentage of two other generating plants, which provide approximately 704 MW.
- No black start capability. Although, able to tie into another state's system for black start capability if necessary.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- Utility AG's Y2K readiness efforts were begun in 1996 with Utility AG's IT director, having sole Y2K responsibility and with a budget of $1.8M. These initial efforts were focused on IT department software.
- In December, 1998, Utility AG contracted an outside firm to perform an independent audit of their Y2K progress. The results of the audit indicated that Utility AG was at high risk for not being Y2K ready by the year 2000.
- To correct the situation, Utility AG formed a five person Y2K core team lead by Utility AG's current Y2K program director. Utility AG's upper level management empowered the team by increasing the Y2K budget to $4.5M and giving them authority over all departments regarding Y2K activities. An internal auditor monitors the Y2K team for progress and accuracy.
- Utility AG has also given executive committee approval to their Y2K mission statement:
- A subsequent audit in March 1999 from the outside firm indicated that Utility AG was on track and would be Y2K ready by the year 2000.

(Role of outside consultants, auditors and their roles)

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Individual departments were responsible for generating inventory lists. Each department determined an inventory method best suited to their records. Methods ranged from physical inspection to extraction from bill of materials. Each department assessed inventory through ranking as either mission critical or non-critical with "mission critical" defined as:
  "Any element or system whose loss could impact service to customers or could otherwise result in permanent and substantial loss to the Company."

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Vendor's statements were accepted without testing only for devices that were obviously not microprocessor controlled. Devices that were tested were sample tested to establish compliance.
- Utility AG's Y2K team established a network based Lotus Notes Y2K reporting application to facilitate central collection of Y2K vendor compliance statements and test information.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Critical suppliers were identified through examination of purchasing records and included materials vendors and natural gas suppliers

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Utility AG has chosen to test a representative sample of each mission critical device containing an embedded microprocessor with date functionality after receiving a vendor compliance statement for that device. Testing of these devices includes rollover testing for key Y2K problematic dates with power down rollover tests where appropriate.
- Utility AG has also performed an integrated test of their EMS system following guidelines set forth by the system's vendor. (See section 4.4 below for a more complete description.)
- Utility AG is using a Lotus Notes based network application to facilitate central test result reporting from individual departments. At the time of our visit, field notes for tested embedded processor devices were complete, but the network based reporting was still in process.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units;)

- For in-house applications, Utility AG has chosen to remediate internally with internal and external auditing to ensure complete remediation. Utility AG has not identified any mission critical embedded processor devices requiring remediation

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Utility AG is considered a city leader for Y2K readiness efforts. They have published a Tri-Fold leaflet that is sent out in response to Y2K readiness requests.
- Utility AG has asked 5 or 6 of their largest customers what their anticipated load will be to ensure that they do not shut down unexpectedly on New Year's Eve.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Utility AG has a documented change control process that is required for additions or modifications to hardware and software. Utility AG also has an internal auditor on their Y2K team whose responsibilities include change control.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

Utility AG's contingency plan is characterized by the following:
- The contingency plan is brief but concise. It assumes an outage of a few hours duration[1]. The plan assumes that Utility AG will be connected to the rest of Interconnection when going into year 2000.
- Utility AG participated in the 4/9/99 drill and will also participate in the 9/9/99 exercise[2].
- Utility has had several outages[3] in 1995 and 1996, which have proven that the system restoration and power curtailment procedures work.
- Major customers with loads that can be shed are: One (21 MW); Two (8MW); Three (5MW), Four.
- Customer communications re not a part of the contingency plan but is a stand-alone plan focusing on print media, radio and TV.
- Utility AG has used simple risk analysis to prioritize allocation of resources.
- Fuel for local plants is primarily gas which is burnt as it arrives. If gas is in short supply, oil can be substituted and some plants may be running on oil in case there is a disturbance of the gas supply early on January 1st, 2000.

The plan assumes that the local telephone service will be available for outage reports.

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[1] Batteries in substations last for 4 hours but fuel (oil) supply is available for a 7-day horizon and water storage is capable of handling the needs for 30 days. .

[2] Satellite phones will be added prior to this exercise.

[3] Three 345 kV lines to the west are used to bring in power from another provider and if needed, a second is available. However, the 104 MW from the provider are under contract to buyer in another state. These lines have relayed out four times in 95 and 96 as a result of protective relaying problems. A remedial action scheme (RAS) has been installed which utilizes voters to reduce the risk for false trips.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Utility AG had originally budgeted $1.8M for Y2K readiness efforts. This was increased to $4.5M following a review from an independent auditor (see section 3.1, Start of Y2K preparation). Utility AG estimates that half of this will be used for embedded costs.
- Utility AG has participated in the NERC April 9 drill by testing communications between systems. This effort was coordinated with other utilities. Utility AG also plans to be an active participant in the NERC September 9 drill.
- At the time of our assessment, the only remaining Y2K work on mission critical sitemaps was integrated testing of the EMS system. This test was performed on the last day of our visit.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

Documents received and reviewed by assessors at Utility AG include the following:
- Schedule
- Budgetary information
- Emergency procedures manual
- Contingency procedures document
- Technical staffing plan
- Draft communications plan
- Regional Reliability Council contingency plan
- Management reports
- April 9th drill procedures
- NERC reports (plant)
- NERC reports (switchyard)
- Other reports
- Customer communications plan
- EMS integrated testing procedure

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- Utility AG joined EPRI's Y2K database program and has not relied on vendor compliance statements for any mission critical devices. Utility AG is in the process of automating the test procedure and test result reporting process using a Lotus Notes network-based application. Although the electronic test result data was incomplete, it was explained that the testing was complete but not yet keyed into the system. An inspection of field notes,

which were more complete, supported this explanation. The test procedure appeared to be adequate for catching Y2K problematic dates.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Utility AG performed bench testing of an ABB 2000R and a Schweitzer 321 relay for assessors at our request. This test was conducted using a laptop to communicate with the relays and relay functionality was tested before, during and after key Y2K dates. All tested functions passed bench tests.
- Utility AG also performed an integrated test of their EMS system. The scheduling of this test coincided with our assessment visit and two assessors were present to witness it. The test procedure consisted of a cold boot of the EMS system with the system clock set to 10 minutes before midnight, December 31, 1999. Proper operation of the system was observed during the Year 2000 rollover. Also, a number of control operations were tested after the rollover including forced ramping of generators and switching operations. All tested control operations performed as expected.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

Name: Title: Acting Manager of Customer Services
- He was confident in the Y2K team's readiness efforts. His main concerns were with transmission system intertie problems.

5.2 Interview #2 –

Name: Title: Y2K Business Project Manager
- Also confident in the Y2K team's readiness efforts. His main concerns were with business contingency plans.

5.3 Key Concerns of Utility Managers

(Include anything that may be helpful in understanding the reasons for the concern)

- Utility AG managers are concerned about completeness of Y2K inventories and have addressed this concern by appointing internal auditors and contracting independent auditors to review their work. Utility AG managers have also expressed concerns over acts of vandalism coinciding with the century rollover.

6. List of Key People Participating in the Assessment

6.1 Utility people

- Y2K Program Director
- Vice President - Administration
- Y2K Documentation Coordinator
- Y2K Business Project Manager
- Y2K Program Auditor
- Y2K Public Relations Manager

<u>Organization Visited: Utility AH</u>

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the on-site review, the assessor evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessor assigned an overall level of risk as follows:

Level 3: Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Strong commitment to achieving Y2K readiness
ii)   Good Y2K contingency plan
iii)   Project decentralization facilitates department base knowledge use, however, interpretation of accountability and documentation standards may vary
iv)   Relied on vendor Y2K assertions, instead of testing, for some mission critical devices
v)   Need to complete documentation of Y2K project results

2. Profile of Utility

2.1 General statistical information

Utility Type:	IOU
Annual Gross Revenue:	
Control Area	
System peak Load:	1,200 MW
Load Characteristics:	
No. of Residential Customers	Approximately 150,000
No. of Commercial Customers	
No. of Industrial Customers	
No. of Other Customers	
Number of Substations	16 bulk 42 distribution

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- The utility has sold off the generating plants.
- The utility is a subsidiary.

- The utility serves loads in multiple stated, although geographically the utility is compact. It is interconnected with several other utilities including.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- The Y2K program was initiated in 1996 from the CEO and centered on the IT group. In 1997 it was expanded to cover mission critical systems at a later date.
- Team leader was member of the Executive Committee.

(Role of outside consultants, auditors and their roles)

- Consultant was used to help develop the Y2K assessment, testing and remediation plan for the EMS/SCADA system.
- Consultant was used to assist with assessing the communication system.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Identified all devices with electronic circuits using walkthroughs, physical inventories, bill-of-materials. A questionnaire was used to help focus on the relevant set of equipment.
- Consultant reviewed the inventory and helped to narrow it down to the set of equipment that required further assessments.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- EPRI database information, vendor information and information from other utilities was used to assess the Y2K readiness status of the inventoried equipment.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Consultant provided expert advice on what needed further investigations and testing.

3.3 Test strategy and procedures
(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- Testing strategies varied from department to department. Some departments tested all mission critical equipment[1] but other departments tested only that equipment for which Y2K readiness could not be establish through other sources of information, such as vendors.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- The GM test plan was a model for the test program. Nine critical test dates were tested for.
- A test bed containing the critical modules of the SCADA/EMS system was used for verification of the SCADA/EMS functions. This was a fully integrated system test conducted by the vendor and witnessed by the utility and the consultant.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Replacement of equipment if this was the most cost effective approach.
- Upgrading[2] of the system if this appropriate.
- Accepted the system if there was a Y2K date problem that impacted data logging only, and not the operation of the power system. That is the "problem" was merely cosmetic.
- A token ring LAN has been replaced with an Ethernet LAN.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Major loads include plastic manufacturer, pharmaceutical laboratory, and an aluminum plant.
- Critical loads include hospitals, telephone switching stations, and municipalities.
- Company is getting active in outreach programs to their customers, such as town meetings and has stated in the newspaper that Y2K will not affect their operations.
- Most of their critical suppliers have responded to their Y2K status letters. Still some concerns with the telephone company due to lack of Y2K information on their specific circuits. Information from telephone company is from their web site only.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Public Service Commission audits.
- Internal auditing department is providing quality control.

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[1] The communications systems were completely tested. The SCADA system was tested using a specially configured test system, but some systems in the T&D system were tested to a lesser degree.
[2] The SCADA/EMS system was upgraded.

- Any new procurement includes wording requiring Y2K compliance.
- "Clean management" procedures have been adopted.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system –overloads etc.)

- Utility is responsible for providing the dispatching function for "black start" although it no longer owns the plants.
- Power curtailments are handled by the power pool and implemented by the utility as per instruction form the pool.
- Satellite phones and utility owned radio available for communication with power pools and utility crews even if the public network is unavailable.
- Personnel from EMS/SCADA vendor will be on site prior to the new year and for a few days after.
- Utility facilities will be manned during the 12/31/99 rollover to the New Year.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- Budget for Y2K is $8.5M, spent $6.5M as of 6/30/99. Company is well positioned to complete all Y2K work in advance of 12/31/99. Needs to continue to complete documenting the Y2K project results. Database doesn't match with actual equipment status in many instances.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- As noted above, there are holes in the project documentation that need to be filled in as soon as possible. Testing of the EMS/SCADA system was quite thorough, as was the testing of the communications systems. Other T&D areas were not as thorough.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- SCADA/EMS system underwent[3] a thorough test using a special test bed made up from redundant system modules.
- Vendor information was used for some GEC digital relays[4]. Documents on file stated that the relays were not date dependent.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Retest of a mission critical device was requested, but the utility declined stating lack of personnel because of workload due to the recent heat wave.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Manager, System Distribution
- He is well satisfied with present status of the Y2K program, and believes they are ready for the Y2K rollover. He will retest all mission critical systems after the rollover to be safe. He has participated in Y2K testing, but is also comfortable in accepting vendor assertions for Y2K readiness. He was a major participant in writing their contingency plan for all the operations areas. The company has conducted Y2K training in certain areas, such as evacuation of the communication center, and how to operate if the EMS/SCADA system is lost.

6. List of Key People Participating in the Assessment

6.1 Utility people

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[3] A test involving the state estimator did not run as expected so the expected result was not met. The test was classified as a "pass" although it technically failed. However, the state estimator did not stall the computer so the test demonstrated that the state estimator should run in the year 2000.

[4] The relays were classified as backup relays and therefore less critical than a primary relay. However, backup relays take out a larger part of the power system if they operate. Thus, a false operation caused by a systematic design defect could lead to major system outages. This was discussed with the person in charge.

Organization Visited: Utility AI

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 3:   Company should meet NERC Y2K readiness date (6/30/99) and will be Y2K ready by 12/31/99.

The assessors reached this conclusion based on the following insights:

i)   Strong company commitment to achieving Y2K readiness
ii)   Have tested all mission-critical devices that are testable, at least by type-testing
iii)   Project decentralization facilitates business unit specialized knowledge use. However, interpretation of accountability and documentation standards may vary.
iv)   Implemented a Y2K test lab for client/server applications, which was helpful.

2 Profile of Utility

2.1 General statistical information

Utility Type:	Investor Owned
Annual Gross Revenue:	$631 Million
Control Area	
System peak Load:	1260 MW

Load Characteristics:	
No. of Residential Customers	281591
No. of Commercial Customers	29468
No. of Industrial Customers	1752
No. of Other Customers	1172

Number of Substations	25 bulk, 38 distribution per annual report
	28 bulk, 50 distribution per meeting

2.2 Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- Utility recently divested fossil generation. Purchaser was an IPP, who provides generation and ancillary services under bilateral contract.
- Utility has no transmission customers.
- Major and/or critical loads include:
    - A University (25 MW load, with half internally cogen)
    - A manufacturing company (15-18 MW)
    - A major financial services entity (several MW)
    - Several hospitals
    - 911 center in a city served
- There are few 24/7 industrial loads other than a chemical plant

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

(Role of outside consultants, auditors and their roles)

- Started looking at issues in June 1996. Formed project within IT, then rolled it out to the remainder of the company. Formed committee. Outsourced for methodology. A major consulting firm was selected after a formal competition.

- Governance of the Y2K effort is by a Sponsors Committee consisting of the Board Vice Chairman/CFO, two group VP's, the Controller, and the Treasurer. (Prior to divestiture there was a third group VP.) The Sponsors Committee meets bi-weekly and reports to the Chairman/President/CEO. The signature of a sponsor is required on certain documents such as approval of test results.

- Power system efforts were done in-house. Mainframe efforts were outsourced and performed on a destructive testing facility.

- The consulting firm maintains an on-line repository that provides status, reports, and documentation maintenance. The repository is essentially a document index database. Actual documents are maintained in hard copy. For power system equipment the business unit retains the documents themselves. Data entry to the repository is done by the relevant consulting firm team leader.

- Organization is centralized but work is by business units. There are two Y2K co-coordinators, one for internal issues and one for external issues. Business unit project managers lead efforts within each business unit and meet as required.

- The utility was active in instigating accelerated Y2K efforts at the ISO/Poolco

- The Y2K efforts are being impacted by the schedule for retail open access, which begins early in 2000.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

(Assessment strategy/ testing- relied on vendor information sample testing, simple testing – reduced date set etc.)

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- For inventory, interviewed critical people from each business unit. Mapped business processes to determine criticality. Some reporting is organized by business process. Used inventory of hardware and deleted non-date and non-critical.

- Organized into four levels of criticality. Level 1 addresses business processes with significant impact on safety, customers, revenue, or regulatory compliance. Level 2 includes processes where failure would be disruptive but where work-arounds are available with negative cost and service implications. Failure of Level 3 processes would be occasionally inconvenient and/or an impediment to service or cost improvement, but could be remediated in the future. Level 4 processes would produce nuisance or confusion if failed, but without direct negative business consequences.

- Assessment was by a combination of phone calls, letters to vendors, and web page use. However, tested everything possible and have contingency plans for all criticality level 1 items or services regardless of vendor response.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Tested everything possible.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- Remediation by H/W replacement or retirement and S/W windowing (with fixed pivot date of 2030)

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition form year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- Has used web page, materials for response to customer inquiries, briefings for major customers, and other means to contact customers.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Was audited by the corporate outside auditor in December 1998, but report has not yet been provided.

- Was audited by a contractor for the state Public Service Commission.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Intend to use existing contingency plans as basis. Storm Plan (one of the plans to be included) is very detailed. Contingency plan draft is relatively detailed at top level. Looking at a variety of scenarios to be addressed. For example, strategies are documented such as intent to use roving substation patrols to remediate loss of telemetry if that occurs.

- Have eliminated exposure to the telco by providing backup systems.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The utility is Y2K ready

- A logging and history related function of the ACS SCADA failed the Y2K test, causing problems with utility-written Fortran applications. The SCADA is planned to be remediated by rolling back the year in two steps, in such a manner as to have the day-of-the-week agree with the day-of-the-month. (The remediation changes the date to 12-31-1993 on 12-31-1999, and then changes the date to 2-27-1989 on 2-28-2000. This maintains the relationship between day-of-the-week and day-of-the-month until March, 2003.) This produces incorrect logs but has been approved by operations as an approach. They intend to purchase a new

SCADA by 2Q2000 to become operational 1Q2001, after seeing what the impacts of retail open access will be on the SCADA. The SCADA could not be remediated by rolling back to 1972, because the platform will not take a date prior to 1980. Also, the particular logging and history function is currently being used only by the utility (which may have been the only user ever.) The cost quoted for remediation by ACS was deemed excessive for a machine that is planned to be replaced in the near future.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- Reviewed voluminous documentation, including: excerpt from annual report discussing Y2K, audit report by the PSC contractor, minutes of Sponsors Committee meetings, Remediation plan (briefing), vendor/suppliers list and status, Contingency Plan , Storm Plan, Testing file, inventory, selected tests including SCADA and others.

- Found inventory detail to be variable by equipment type and business unit. For example, PCs were listed individually by serial number but relays were listed by type only.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- In some cases the test records reflected failure of the tests but were marked as having passed the tests. The difference was due to the test conductor interpreting the operational impact of the failure. Commented to the utility that the record should be marked as failure of the test, but annotated as being Y2K ready and the test interpretation explained.

- It was also noted that the repository contains only the test results, with the test data being held by the business unit and no detailed traceability information appearing in the repository.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions for interview; concerns and or convictions and reasons for these)

5.2 Interview #2 –

6. List of Key People Participating in the Assessment

6.1 Utility people

- The Y2K Co-Coordinator (external)
- The Y2K Co-Coordinator (internal)
- The consulting firm team lead for Y2K repository/test
- The Director of IS
- The VP Planning (ISO/Poolco committee rep)
- The VP Client Services
- The General Manager of the Electric System
- The Y2K Project Manager for T&D

Organization Visited: Utility AJ

1. Year 2000 Readiness

Select Level 1, 2 or 3 from below (delete those that do not apply)

Based on the information gathered from the On Site Review, the assessors evaluated the company's ability to meet the NERC Y2K readiness dates for all mission critical functions. The assessors assigned an overall level of risk as follows:

Level 2: Company has some issues that cause concern for meeting NERC Y2K readiness date (6/30/99), but should be Y2K ready by 12/31/99. There is a need to continue to monitor the company's progress.

The assessors reached this conclusion based on the following insights:

 i) Well implemented and documented Y2K plan.
 ii) Strong corporate and plant commitment to achieving Y2K readiness
 iii) Tested all mission critical devices and systems that could be tested. Used vendor testing for those they couldn't test
 iv) Can't complete Y2K remediation until maintenance shutdown in early September, when distributed controllers and computers will be upgraded

2. Profile of Utility

2.1 General statistical information

Utility Type:	Independent Power Producer
Annual Gross Revenue:	Unknown
Control Area	
System peak Load:	1000 MW

Load Characteristics:
 No. of Residential Customers
 No. of Commercial Customers
 No. of Industrial Customers 1
 No. of Other Customers 2

Number of Substations

Local Y2K environment

(Include relevant information about the utility such as what fuel base that is used for the generation, black start capability, types of loads served by the utility; critical loads, dependence on power from others, degree of integration with other utilities etc.)

- It produces 1000 MW of generation that is sold to three customers. For the most part, the plant is base loaded. There are terms in their contracts where under certain circumstances the output of the plant is curtailed. They also supply steam and hot water services to the others. The plant is fired by natural gas and is a combined cycle generating facility. It has no ability to black start itself. It must have electricity from the local utility to accomplish this. From a control standpoint, it depends on the local utility it is connected to for all grid control functions.

3. Year 2000 Readiness History

3.1 Start of Y2K preparation

(When did the preparation begin, at whose initiative, what was the budget and personnel allocated to achieve Y2K readiness, key people in Y2K project with reporting – organization chart if available to be attached)

- In early 1998, a corporate Y2K committee was formed to oversee Y2K efforts for the corporation. The corporate committee sent out Y2K guidelines based on the EPRI model to each facility. Each facility was responsible for their Y2K project work. Monthly reports are sent to the corporate Y2K committee chairman delineating project status and budget items for Y2K. Y2K status reports are given to the Board of Directors at all board meetings (three times a year).
- The Plant Manager appointed a Y2K Project Manager. He utilized key technicians within the plant to oversee various areas for the Y2K project.
- There is no formal Y2K budget, but there has been no problem with getting the funds necessary for the Y2K project work.

(Role of outside consultants, auditors and their roles)

- An outside consultant was hired to help with the project. They did an inventory, which was matched against the inventory done by plant personnel. This did not work well (inventories did not match up). Another consultant was hired to set up and maintain a corporate database for the Y2K project. The local plant maintains its own database for inventory, remediation and testing. Access to this database is limited to the Y2K Project Manager and the database administrator. Each item in the inventory has a unique number that is used to track the item throughout the project work.
- The consultant is also auditing all Y2K projects. The audit results are given to the plant and sent to the corporate Y2K committee, as well.

3.2 Assessment strategy

(Inventory process - Method used to identify inventory – walk through, BOM combinations etc., Identification of all possible components, all digital or only the critical digital systems. Definition of critical. That is business critical or mission critical - keep the lights on)

- Each of the seven technicians did an inventory in their respective areas using walkthroughs and bills of material. If the device has power, they were to look at it. If the device has a microprocessor, inventory it. This was done in the fall of 1998. All IT software was the responsibility of the corporate IT group. No mission critical software in IT systems. All operating system software was the responsibility of the plant. The Y2K Project Manager was responsible for operating software.

(Assessment strategy/ testing- relied on vendor information; sample testing, simple testing – reduced date set etc.)

- Inventory items were prioritized A, B, or C. Any device or system deemed to be mission critical was a priority A. All A devices and systems were tested on-site or for those that could not be tested on-site, the vendor was hired to develop and conduct tests at the vendors facilities. The vendor testing was witnessed by plant personnel. The EPRI database was also used to some extent to determine Y2K status of certain devices.
  - All B and C devices and systems were tested whenever possible.
  - A: critical to plant safety, reliability or regulatory/contractual compliance.
  - B: may cause temporary loss of information or minor plant operating upset.
  - C: administrative or other minor impact, easily corrected.
- There were two types of Y2K ready status: vendor and company. No device or system was rated company Y2K ready unless tested by the company.
- All tests must be signed by the two testers and then by the Y2K Project Manager.

(Critical supplier approach - Method used to identify critical suppliers; e.g. purchase records etc. (Power suppliers, Fuel suppliers, Water suppliers, Phone service, and other vendor strategy)

- Letters were sent to all critical suppliers and most have responded. Telephone supplier information is all from the telephone supplier's web site.

3.3 Test strategy and procedures

(Risk based priority test strategy - Highest business impact tests first and more comprehensive tests applied. Lower impact not tested at all or at a less detailed level or other strategies)

- All mission critical devices and systems were tested.

(Testing procedures - Compliance assessment testing: Test date and date transitions testing; Application tests; Validation tests (of remediation work); Differentiation between large and complex systems and small, stand-alone systems with imbedded chips; Integrated tests or unit tests; Test audits)

- Testing consisted of 13 different elements using a written test plan. Two testers did testing in assigned areas of responsibility. Non mission critical devices were tested whenever possible.
- Both testers and Y2K Project Manager sign off on test results.

3.4 Remediation strategy

(Fix or replace; in-house versus outsourcing; live with the problem and adjust settings manually; differentiation between large and complex systems and small stand-alone units)

- There are four categories for remediation: no action, replace, repair and work around. Based on the device or system, one of the four categories is assigned to each device or system.

3.5 Customer information and survey responses

(Active customer contacts to avoid irrational behavior of customers at the transition from year 1999 to 2000; response to requests for information on Y2K readiness from others such as local phone company, hospitals etc.)

- They are in contact with their major customers and suppliers, and working with their local utility on contingency planning.

3.6 Quality control to ensure that Y2K readiness is achieved and maintained

(Role of inside auditors; outside auditors, NERC test participation, procedures in place to ensure that readiness state is not lost as a result of warranty changes, upgrades etc.)

- Have a Y2K compliance plan to remain Y2K ready for all new equipment. It is maintained by purchase order language and the knowledge of the Y2K project team.

3.7 Contingency plans

(Horizon for plan, trial of plan procedures, special staffing and manual controls at the transition, self-generation and special provisions to deal with large load swings, dependency on public communication systems and preparedness for phone system – including cellular system – overloads etc.)

- Plan is based on two contingency types: internal risk and external risk. Internal risks are prioritized as to type of risk and what the contingency is for that risk. External risks are not prioritized. The plan covers the end of the year rollover and leap year rollover.
- They have back up communication plans in case of loss of telephone. Local utility will have someone with a radio stationed in the local switchyard.
- The contingency plan is to be completed by 9/1/99.

4. Position of the Utility at Time of Assessment

4.1 General position

(Progress on schedule towards Y2K readiness; budget spent versus projected, remaining work; criticality of this work; participation in April 9 NERC Exercise; opinions of auditors – if any etc.)

- The capital outlay for Y2K is about $500k. O&M hours dedicated to Y2K have not been tracked.
- All of the Y2K remediation and testing has been completed except for the work to be completed during the maintenance outage in September. All the necessary parts are on hand and just need to be installed and tested. This will not pose a problem, since this work is under their control and does not rely on outside resources.

4.2 Review of plans and relevant documentation

(Existence of documents; errors and omissions in documents; vendor/supplier readiness information etc.)

- They have an excellent tracking system for the Y2K project. There are 403 entries in the database which account for 2200 mission critical items and 3000 total items. The database is kept up to date by the administrator and each device and system can be track from start to completion.
- The contingency plan is fairly well completed as noted above.

4.3 Review of test records

(Existence of test procedures; test result documentation; completeness on testing to known problem dates, test procedures likely to catch the known problems; reliance on vendor information or actual testing of mission critical systems, use of test data from sources such as EPRI, other utilities or other organizations with relevant data etc.)

- All testing information resides in the technician's blue book. All completed testing results are kept in a central file. There are written test procedures for all mission critical testing and signed off test sheets for each device and system that was tested.
- Regardless if a vendor stated a device or system was Y2K ready, it was still tested.
- All pertinent Y2K dates were tested. This includes yearend rollover and leap year.

4.4 Retest of selected equipment/systems

(Selection process – assessors allowed to select or utility selection, repeat of test generated same results as when utility (or tester) did the test last time etc.)

- Retested a variable speed drive and a chemical analyzer that is used for maintaining proper chemical balance in the plant operation. Tested rollovers for yearend and leap year with power on and off. Re-ran test using their test procedures. Variable speed drive passed all tests.
- Chemical analyzer flunked both tests, but there is a workaround that will not affect the operation of the plant. The date in the analyzer is only to give the operator visual date information and doesn't affect the operation of the device.

5. Interviews

5.1 Interview #1 – *name and title of person interviewed*

(Impressions from interview; concerns and or convictions and reasons for these)

Plant Manager

- The Y2K Project Manager reports to the Plant Manager. He reports monthly to corporate on the plant's Y2K status. He is very aware of the Y2K project status, and is satisfied with the Y2K project. He is certain they will be Y2K ready after the maintenance outage in September. He feels that some further work needs to be done to complete the contingency plan. This includes working with the local utility and the power pool. Still need to conduct contingency plan training and drills during the fourth quarter. There are still some areas that need to be worked out with critical suppliers of goods and services.

6. List of Key People Participating in the Assessment

6.1 Utility people

EXHIBIT V

Sample Retests Utility X

A Year 2000 Readiness Disclosure

Testing at Utility X

Review of test plans/procedures/results that have been used to verify Y2k readiness for a sample of items in the inventory.

Do test plans/procedures appear adequate and complete?   Yes   X   No

Do the test results seem correct and complete?   Yes   X   No

Note: We reviewed the test plans for the EMS/DMS (as part of our review of the internal audit package), but did not see the test plans for the transfer switch. However, the personnel who accompanied us on the transfer switch test included some who had performed the actual tests, and we discussed the procedures with them.

If no, amplify why not.

Rerun two of the tests.

Device/Component/system name: Energy Management System (EMS)/Distribution Management System (DMS)

Test description: Utility established a test bed for the EMS/DMS. They set up a computer similar to the EMS/DMS platform to run the tests. In the full test bed, the system was driven by a power system simulator that produced inputs similar to those that would be seen in the real system. We observed tests on a portion of the test bed that did not include the simulator. The tests we observed did use two dummy RTUs, one of each type found in the existing system. The RTUs had dummy devices that simulated each data type (analog and status inputs, control output) found in the existing RTUs.

The system received its time synchronization from a GPS receiver that is intended to replace the GOES receiver in the existing system. The GPS receiver was set to a date offset placing the time one half hour before Y2k date rollover. During the half hour, selected functions of the system were exercised. After the rollover, the functions of the system were again exercised. (In the actual tests, the system users performed all of the tests, including several that they had defined, in addition to those defined by the system engineers/maintainers. We were shown the sign-off sheets. We were told that the tests were also witnessed by an internal auditor, who actually checked to see that the relay representing the dummy control output changed position when the screen indicated that its position had changed.)

Test results: The results of both exercises of the system functions were the same.

A Year 2000 Readiness Disclosure

Comments: The observed results were fully anticipated, given that the
                     EMS/DMS is based on a platform and a product that do not
                     "break" at Y2k date rollover. Platform uses a starting date of
                     November 17, 1858 with a 64 bit offset, and does not break
                     until January 14, 2047. Vendor uses a date based on a date in
                     the 1970s with a sufficient offset to get well past the Y2k
                     rollover.

EXHIBIT VI

Sampling Statistics

SAMPLING STATISTICS

The number of potential utilities to be evaluated is large and the sample populations are small, which could lead to questions about the validity of the study. The following table shows the estimated populations of each segment reviewed and the sample size of each segment.

Utility Category	Population Size	Sample Size
Municipals < 5,000	1,234	10
Municipals ≥ 5,000	744	10
Rural Electric Cooperatives	843	10
Bulk Entities Including IPP	268	6
Total	3,089	36

The sample size for the distribution systems is 10 per segment, or a total of 30, close to a 1% sample for each group. For the following statistical sample analysis, we assume a true 1% sample size.

The sampling method is one in which the sample is not replaced. Also, the outcome of the study is if the utility "is" or "is not" Y2k Ready or projected to be Y2k Ready as of a specific date. This can be represented as a Hypergeometric Probability Distribution, for which a specific outcome with (r) successes and (n-r) failures can be calculated as follows: Need consistency in denoting "r" and "n-r": parentheses or quotation marks?

$$P(n/r) = \frac{\left(\begin{array}{c}\text{Number of Successes in the} \\ \text{Population Taken r at a Time}\end{array}\right)\left(\begin{array}{c}\text{Number of Failures in the} \\ \text{Population Taken n-r at a} \\ \text{Time}\end{array}\right)}{(\text{Total Population Taken n at a Time})}$$

However, for large populations and small sample sizes the probability distribution is approximately equal to the Binomial Probability Distribution, which is going to be used here. The expression for exactly "r" successes using a binomial distribution is:

$$P(r) = \binom{n}{r} p^r (1-p)^{n-r} \text{ where}$$

n = sample size
r = number of successes
p = probability for success

$$\text{and} \quad \binom{n}{r} = \frac{n!}{(n-r)!\, r!}$$

The cumulative probability that there will be between zero and k successes in the sample set is:

$$P(r \le k \mid n, p) = \sum_{r=0}^{k} \binom{n}{r} p^r (1-p)^{n-r}$$

Specifically, for the Y2k study the outcome is either Y2k Ready or Not Y2k Ready. If Success is defined as Y2k Ready, then the probability is described by the function above. In that case, the probability to find any Y2k Not Ready is:

$$P(r \le n - k \mid n, p) = 1 - \sum_{r=0}^{k} \binom{n}{r} p^r (1-p)^{n-r}$$

The probability "p" needed for the expression above however, is unknown. A number of tables showing the binomial coefficients are available. However, this is tedious work and the important information is therefore reproduced below.

The probability that there will be more than "x" Y2k Not Ready in a sample set of 10 if the probability for Y2k Not Ready is "p" is shown in the table below.

p=	0.5	0.4	0.3	0.2	0.1	0.05	0.01
x							
0	0.999023	0.993953	0.971752	0.892626	0.651322	0.401263	0.095618
1	0.989258	0.953643	0.850692	0.62419	0.263901	0.086138	0.004266
2	0.945313	0.83271	0.617217	0.3222	0.070191	0.011504	0.000114
3	0.828125	0.617719	0.350389	0.120874	0.012795	0.001028	2E-06
4	0.623047	0.366897	0.150268	0.032793	0.001635	6.37E-05	2.42E-08
5	0.376953	0.166239	0.047349	0.006369	0.000147	2.75E-06	2.03E-10

Table 2.1

Probability for having more than x Y2k Not Ready in a sample set of n=10 with probability p for Y2k Not Ready

The table shows that with a probability of having 20% of the population Not Ready, there is an 89% chance that there will be more than zero Not Ready in the sample set. However, the probability of finding more than three in the set drops to 12%.

If the municipals are grouped together, the sample size increases to 20. If the municipals are grouped with the rural distribution cooperatives the sample size increases to 30. For these larger sample sets, the probabilities are as shown in Tables 2 and 3.

Table 2.2

**Probability for having more than x Y2k Not Ready in a sample set of
n=20 with probability p for Y2k Not Ready as shown.**

p=	0.5	0.4	0.3	0.2	0.1	0.05	0.01
x							
0	0.999999	0.999963	0.999202	0.988471	0.878423	0.641514	0.182093
1	0.99998	0.999476	0.992363	0.930825	0.608253	0.26416	0.016859
2	0.999799	0.996389	0.964517	0.793915	0.323073	0.075484	0.001004
3	0.998712	0.984039	0.892913	0.588551	0.132953	0.015902	4.26E-05
4	0.994091	0.949048	0.762492	0.370352	0.043174	0.002574	1.37E-06
5	0.979305	0.874401	0.583629	0.195792	0.011253	0.000329	3.44E-08

Table 2.3

**Probability for having more than x Y2k Not Ready in a sample set of
n=30 with probability p for Y2k Not Ready as shown.**

p=	0.5	0.4	0.3	0.2	0.1	0.05	0.01
x							
0	1	1	0.999977	0.998762	0.957609	0.785361	0.2603
1	1	0.999995	0.999688	0.989478	0.816305	0.446458	0.036148
2	1	0.999953	0.997887	0.955821	0.588649	0.187821	0.003318
3	0.999996	0.999687	0.990683	0.877289	0.352561	0.060772	0.000223
4	0.99997	0.99849	0.969845	0.744767	0.175495	0.015636	1.16E-05
5	0.999838	0.994341	0.923405	0.572488	0.07319	0.003282	4.83E-07

Table 2.2 shows that for a 40% Y2k Not Ready probability, the chance
of finding more than 4 in the sample set is 95%. However, for a sample
size of 30, this increases to 99.8%. Since it cannot be assumed that the
probabilities are the same for being Y2k Ready in the three groups, it is
best to study each of the three groups individually.

The IOUs were selected to focus on small and mid-sized entities. Since
the sampling method was not purely random, it is felt that statistical
analysis for the IOUs and IPP is not appropriate. However, a
determination can be made as to the accuracy of the self-reporting from
these entities, which is important.

EXHIBIT VII

Bibliography

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